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NUTRITION AND HYDRATION STATUS OF SOLDIERS CONSUMING THE 18-MAN ARCTIC TRAY PACK RATION MODULE WITH EITHER THE MEAL, READY-TO-EAT OR THE LONG LIFE RATION PACKET DURING A COLD WEATHER FIELD TRAINING EXERCISE

U S ARMY RESEARCH INSTITUTE
OF
ENVIRONMENTAL MEDICINE
Natick, Massachusetts

MARCH 1992

UNITED STATES ARMY
MEDICAL RESEARCH & DEVELOPMENT COMMAND

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This 10-day test evaluated two Army Field Feeding System feeding modalities (T/MRE/T and T/LLRP/T) with 96 male soldiers participating in a cold weather field training exercise. Nutrition/hydration status was assessed from food/fluid intake, body weight and percent fat changes, and urine specific gravity. Energy expenditure was measured on a sub-sample (n=20) who also provided blood samples, and a 24-h urine sample for nitrogen balance. Mean energy intake was similar between groups (3271 and 3035 kcal/d for the T/MRE/T and T/LLRP/T groups, respectively) meeting about 70% of MRDA, and 77% of energy expenditure. Mean intake of protein, vitamins and minerals was adequate except for the T/LLRP/T group's vitamin B_6 (58% of MRDA). Body weight loss (1.1 and 0.6%, respectively) was significant ($p \leq 0.05$) within, but similar between groups. Body fat decreased 10.6 and 4.9%, respectively. Mean nitrogen balance was positive indicating that the energy deficit was not exerting a severe metabolic stress. Further, psychophysiological data indicate that neither group was severely stressed and the rations provided were sufficient to sustain them. Although the LLRP received higher acceptability ratings than the MRE, all the rations were well accepted. It was concluded that neither feeding regimen was better than the other in preventing body weight loss or maintaining nutrition/hydration status. Thus, the feeding modality chosen for Cold Weather Field Feeding depends upon environmental conditions, mission parameters, and water availability and heating capabilities.

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SUMMARY

This test was the third of three Cold Weather Operational Tests designed to evaluate individual packaged and group feeding rations in an arctic environment. The test was conducted for an uninterrupted 10-day period (28 January to 6 February 1991) during the Arctic Warrior Field Training Exercise held in Fort Greely, Alaska. Soldiers (96 male volunteers) from two field artillery batteries of the 5th Battalion, 11th Field Artillery regiment, 6th Infantry Division (Light), with similar mission and activity profiles, participated in this test remaining in the field during the entire test period. Tactical scenario and meal service times were at the discretion of the FTX commander. The test evaluated two Army Field Feeding System (AFFS) feeding modalities that differed in the packaged meal fed for lunch. Both batteries received the 18-Man Arctic Tray Pack Ration Module (T) for the breakfast and dinner meals, while the lunch meal consisted of a Meal, Ready-to-Eat (MRE) for one battery (T/MRE/T = control) and a Long Life Ration Packet (LLRP) for the other (T/LLRP/T = experimental group). The subjects consumed the AFFS rations being tested as their sole source of food.

The data were collected manually with minimal interference to field operations. Data collected included food and fluid intakes, height, body weight, percent body fat, urine specific gravity, activity level, energy expenditure, nitrogen balance, blood chemistry, food acceptability, mood states, and psychophysiological symptoms. Hydration and nutritional status were assessed from the data obtained.

Both groups were fairly homogenous for age, height, initial body weight, and initial percent body fat. During the 10-day test period, both groups lost similar amounts of body weight indicating similar ration consumption. Although this weight loss was significant, it was within the guidelines of three percent weight loss for operational rations. The majority of the body weight loss came from the body fat compartment as indicated by the changes in percent body fat.

The mean energy intake was 3271 and 3035 kcal for the T/MRE/T and T/LLRP/T groups, respectively. With a measured energy expenditure of 4253 kcal/day, energy imbalance was probably responsible for the body weight loss. However, the lack of a preponderance of significantly negative nitrogen balances illustrates that the energy deficit was not exerting a severe metabolic stress. Further, the subjects' intake of protein, vitamins and minerals was adequate except for vitamin B_6 for the T/LLRP/T group.

Even though the T/LLRP/T group gave the LLRP higher ratings than the T/MRE/T group gave the MRE, the amount consumed of the two rations was similar. The higher ratings given by the T/LLRP/T group could have been caused by a "halo effect" of the novel ration. The LLRP was acceptable probably because enough water and heat were available to prepare it. An MRE that can be consumed without preparation or when frozen might be a better choice when water and/or heat are not available. The T Ration, when served warm or hot was also acceptable to the subjects in this test.

The psychophysiological data indicate that both groups were stressed by the change from garrison to cold weather field operations. However, the decrease over time in negative symptoms and moods indicates that neither group was severely stressed by the field exercise and that the rations provided were sufficient to sustain them.

Overall, fluid intake between groups was not significantly different with a mean fluid intake of 3 L for most days. The urinary specific gravity results (1.020-1.025) indicate that neither group was dehydrated, thus hydration status was not a significant factor in food intake and in the comparison of the two feeding regimens.

It was concluded that neither feeding regimen was better than the other. Subjects subsisting exclusively on T/MRE/T or T/LLRP/T feeding regimen lost similar amounts of body weight while maintaining their nutritional and hydration status. Thus, the feeding modality chosen for Cold Weather Field Feeding should depend upon environmental conditions, mission parameters, water availability, and water heating capabilities.

INTRODUCTION

The Arctic is a harsh environment where individual energy requirement is increased and operational rations are subject to freezing. Frozen rations contribute to reduced consumption, caloric deficit, and hypohydration. Further, freezing of rations may compromise the package barrier protection. The 5-15 percent increase in energy requirement imposed by a cold environment and additional energy needed to support work in the cold requires that the quantity of conventional rations fed be increased or supplemented with additional food items. Thus, the cold environment presents a challenge to the Army Field Feeding System (AFFS)[1].

It was proposed in August 1989[2] that complete testing of the AFFS in a cold climate was necessary to test, modify and develop Cold Weather Feeding Doctrine. A series of three sub-tests was required to completely test all aspects of cold weather feeding. The first two sub-tests were conducted in 1989 and 1990, respectively (1,2). The first test was designed to determine the adequacy of the Army's standard multipurpose packaged ration, the Meal, Ready-to-Eat (MRE) for cold weather operations. A cold weather calorie supplement for the MRE (3MREs + Supplement) was tested and found to be superior to simply issuing an additional MRE (4MREs) to meet cold weather calorie requirements (1). The MRE was found to be generally satisfactory for cold weather operations; however the 6th Infantry Division wanted to compare the calorie supplemented MRE against a new dehydrated Ration, Cold Weather (RCW) in the second test conducted in 1990. Both the supplemented MRE and the RCW were satisfactory, with relatively little difference noted between the two rations in this test (2). A final test was needed to integrate a group feeding alternative with the packed ration for a complete picture of the cold weather feeding in the Arctic, hence the necessity for the current test. The current test was the third and last sub-test of Cold Weather Ration Testing. The Arctic T Ration and the feasibility of a dehydrated lightweight meal (Long Life Ration Packet; LLRP) for arctic operations were evaluated in the present test.

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[1]Memorandum for Record, SGRD-UE-NR, 25 July 1989, subject: Pre-meeting Army Field Feeding System Ration Testing.

[2]Memorandum for Commander, U.S. Army Quartermaster School, SGRD-UE-NR, 16 August 1989, subject: Outline Test Plan - Cold Environment.

Work in the cold has long been associated with increased caloric requirements, leading the casual observer to infer that cold in and of itself dramatically increases the requirement for food. While it is true that extra calories are required to warm inhaled air to body temperature and to warm external cold air pumped into and out of cuffs, collars, hems, and other garment openings, these caloric requirements are quite small compared to energy required to work in a cold environment (3). The inefficiencies of locomotion on snow or ice-covered terrain coupled with the extra weight of cold weather clothing and gear are the main determinants of increased energy requirements in the cold (4).

The major problem of cold weather nutrition is providing adequate quantities of water and warm palatable food to meet energy demands (5). Vitamin and mineral requirements are not increased specifically by the cold (6,7,8). The recommended allowances of vitamins and minerals are close to their requirements for a similar level of energy expenditure in a temperate environment (9)(Table 1). Of particular importance is iron nutriture in the cold. Iron deficiency can be especially problematic since it can impair thermoregulation (10). Adequate carbohydrate intake may also be an important factor for sustained physical performance in the cold, similar to its role in warmer environments (11).

Various studies (1,2,12,13) have evaluated the nutritional and logistical suitability of using different operational rations in a cold environment. These studies have shown that the rations tested (the Meal, Ready-to-Eat [MRE], the Ration, Cold Weather [RCW], or the Ration Lightweight [RLW]) were relatively similar in the nutritional support provided. None of these rations proved superior to each other. Consumption of these rations was insufficient to meet the Military Recommended Dietary Allowances (MRDA) for energy (9). Consequently, body weight loss has been the rule, rather than the exception, when troops perform moderate to heavy physical activity in the cold.

There are both advantages and disadvantages associated with current military packaged field rations. The wet pack rations are more convenient to use, but are bulkier and heavier than the dehydrated rations, and their water content makes them susceptible to freezing. The capability of the retort pouch to withstand the rigors of a cold environment (ice crystal perforation of the pouch lining) and the ability of soldiers to cope with the ration once it becomes frozen remain a concern. The dehydrated rations require additional water and a way to heat the water to adequately utilize most of the food components in them. Presently, the decision as to which ration to use depends upon the logistical and tactical scenarios.

Table 1. Military Recommended Dietary Allowances[1]

Nutrient	Unit	Dietary Allowance[2]	
		Temperate Climate	Cold Climate[3]
Energy	kcal	3200 (2800-3600)	**4500**
Protein	g	100	100
Vitamin A	IU	5000	5000
Vitamin D	mcg	10	10
Vitamin E	mg TE	10	10
Ascorbic Acid	mg	60	60
Thiamin	mg	1.6	1.6
Riboflavin	mg	1.9	1.9
Niacin	mg NE	21	21
Vitamin B_6	mg	2.2	2.2
Folacin	mcg	400	400
Vitamin B_{12}	mcg	3	3
Calcium	mg	800-1200	800-1200
Phosphorus	mg	800-1200	800-1200
Magnesium	mg	350-400	350-400
Iron	mg	10-18	10-18
Zinc	mg	15	15
Sodium[4]	mg	5500	5500

[1]Source: AR 40-25 (9).

[2]MRDA for males ≥ 17 years old.

[3]Dietary allowance for cold environment (< 57.2°F).

[4]Maximum amount allowed.

Group feeding rations such as the Tray Pack (T Ration) are used when centralized feeding is possible to relieve the monotony of individual packaged rations. Historically, when T Rations are used in cold climates, they are supplemented with hot beverages at the unit level. This practice not only enhances soldiers' morale, but it increases the caloric content of the ration which otherwise would not meet the MRDA for energy. The new Arctic T Ration includes a cold weather caloric supplement tailored after the supplements developed by the 6th Infantry Division based upon their experience in Alaska. The present test was the first nutritional field study of the Arctic T Ration.

The purpose of this test was to assess the nutritional adequacy and acceptance of a combination of the Arctic T Ration and MRE or LLRP served to soldiers engaged in moderate to heavy physical activity in a cold field environment. The hydration status of these soldiers also was assessed. Further, psychophysiological data were collected to assess mood states and the incidence of neurophysiological symptoms during cold weather field training. A sub-test to assess the effect of cold weather on energy expenditure and nitrogen balance was incorporated into this test as an investigative issue.

OBJECTIVES

OVERALL TEST OBJECTIVES

1. To determine which individual ration, MRE or LLRP, is better, nutritionally and operationally, when served with the Arctic T Ration in a cold environment.

2. To evaluate the nutritional adequacy of a combination of the MRE or LLRP with the Arctic T Ration in a cold environment.

3. To evaluate soldier consumption and acceptance of the MRE, LLRP and Arctic T rations in a cold environment.

4. To assess changes in mood state and self reported symptoms of environmental stress as a function of feeding regimen in a cold environment.

SPECIFIC TEST OBJECTIVES

The test addressed the following specific questions:

1. Would soldiers operating in an extremely cold environment and fed according to AFFS cold weather feeding doctrine consume enough energy, protein, vitamins, and minerals to meet the MRDA (Table 1) for these nutrients?

2. Would body weight and lean body mass of the soldiers change between D-1 and D+11 when consuming an Arctic T Breakfast, MRE Lunch and Arctic T Dinner (T/MRE/T) or an Arctic T Breakfast, LLRP Lunch and Arctic T Dinner (T/LLRP/T) exclusively?

3. Would the hydration status of soldiers consuming the T/MRE/T or T/LLRP/T rations in a cold environment change?

4. Was there a relationship between mood state and ration type?

5. Was there a relationship between self reported symptoms of environmental stress and ration type?

6. Was the frequency of gastrointestinal problems associated with consumption of the MRE, LLRP and Arctic T rations?

7. What ration utilization (human factors) problems would be associated with cold weather field feeding?

OVERALL SUB-TEST OBJECTIVE

1. To measure energy expenditure and nitrogen balance of soldiers in a cold environment.

SPECIFIC SUB-TEST OBJECTIVES

The sub-test addressed the following specific questions:

1. What were the energy expenditure and physical activity pattern of soldiers engaged in cold weather operations?

2. Was there an effect of field operations in extreme cold on nitrogen balance?

METHODS

OVERVIEW

The test was conducted with volunteer soldiers from A and B Batteries from the 5/11th Field Artillery Battalion of the 6th Infantry Division (Light) during the Arctic Warrior Field Training Exercise held in Fort Greely, AK between 28 January and 6 February 1991. The test evaluated two Army Field Feeding System (AFFS) feeding modalities (T/MRE/T and T/LLRP/T) with the soldiers consuming these AFFS rations as their sole source of food. No food items were permitted in the field other than those found in the rations being tested. Tactical scenario and meal service times were at the discretion of the FTX Commander. The data were collected manually with minimal interference to field operations, and included daily food and fluid intakes, height, body weight, percent body fat, daily urine specific gravity, activity level, energy expenditure, nitrogen balance, blood chemistry, food acceptability, mood states, and psychophysiological symptoms. Hydration and nutritional status was assessed from food and water consumption data, and blood and urine chemistries.

TEST SUBJECTS

The test group consisted of 96 male volunteers from the 5/11th Field Artillery Battalion; 45 from A Battery and 51 from B Battery. Both batteries had similar military occupational specialty distributions (Table 2). After receiving a detailed verbal and written explanation as to the nature, duration, purpose, risks and benefits of the study, the volunteers freely gave their consent by signing the Volunteer Agreement Affidavit (Appendix A).

Table 2. Military Occupational Specialties (MOS)

Category	B Battery		A Battery	
	n	%	n	%
Field Artillery Officer (13A)	3	5.9	3	6.7
Cannon Crewmember (13B)	37	72.5	34	75.6
Cannon Fire Direction Specialist (13E)	3	5.9	4	8.9
Others[1]	8	15.7	4	8.9
Total	51		45	

[1]Communications, Signal, Mechanics, etc.

RATION DESCRIPTION

Meal, Ready-to-Eat

The Meal, Ready-to-Eat (MRE) is the current standard operational ration. It is an individual meal containing mainly thermo-processed (wet-pack) food components which require no preparation, except for reconstitution of beverages. There are 12 menus available, each containing an entree, crackers, a spread (cheese, peanut butter or jelly), cold beverage powder and accessory packet (coffee, cream substitute, sugar, salt, chewing gum, matches, towelette and toilet paper). Seven menus contain fruit (2 wet-packed and 5 freeze dried), and nine contain either cake, chocolate brownies or cookies. Four menus include a commercial candy (M&M, or Charms). The entree package may be heated by immersing it in a canteen cup of hot water. The average energy provided is approximately 1300 kilocalories per menu, which corresponds to 29 percent of the Military Recommended Dietary Allowance (MRDA). Packaging is lightweight, flexible, and suitable to eat out of in lieu of mess gear. The individual menus have an average gross weight of approximately 1.5 pounds and a volume slightly over 0.05 cubic feet. The menus are packed 12 per case. The version of MRE tested in this study was MRE VIII. No individual ration heating devices were provided during this study.

Long Life Ration Packet

The Long Life Ration Packet (LLRP) is an individual dehydrated/low moisture meal package. There are 8 menus available, each containing one entree, one cereal bar, one cookie component, one candy component, one instant beverage, one spoon, and one accessory packet (sugar, cream substitute, instant coffee, salt, toilet paper, gum, and matches). The entrees are precooked, freeze-dehydrated and can be reconstituted rapidly with either cold or hot water. The low moisture foods are ready to eat. The average energy provided is 1400 kilocalories per meal for the commercial entree prototype, or 31 percent of the MRDA. The LLRP is lightweight (< 1.0 pound), low volume (0.04 cubic feet), and an extended shelf-life ration which can be used for special operations, patrol, or high intensity combat missions for up to 10 days with limited resupply. There are 12 meals per case for this commercial entree prototype. The LLRP is also heat and cold resistant, since it is a dehydrated ration.

18-Man Arctic Tray Pack Ration Module

The 18-Man Arctic Tray Pack Ration Module (Arctic T) is a standard T Ration with the addition of a caloric supplement. The T Ration is used when food service support is available in the field feeding environment. The T Ration is composed of a variety (10-day breakfast/dinner menu) of wet packed entree, vegetable, dessert, and starch items that have been thermo-processed in flat, rectangular, multi-serving, half-size steam table metal cans, and are ready to heat and serve. The T Ration is supplemented with ultra high temperature treated (UHT) milk and cold cereal. The Arctic T also has 9 packets each of coffee and creamer, 18 packets each of cocoa beverage, 1 of 5 flavors of beverage base, one 2 ounce bottle of hot sauce, 18 individual instant oatmeal packages in assorted flavors, three #2½ cans of fruit, and disposable eating utensils. A standard T Ration meal provides approximately 1200 kilocalories. The Arctic T contains an additional caloric supplement of approximately 1020 kilocalories per meal, consisting of individual pouched bread, cocoa beverage, M&M candy, 9 packets each of coffee, creamer, chicken noodle soup mix, and oatmeal cookie bars, one #2½ can of dehydrated soup and one 2 pound can of ground coffee. Hot cups with lids and styrofoam compartmented clamshell trays are also included. The Arctic T Supplement is packed in a container equal in size to the standard T Ration, and it is strapped to a standard T Ration to assemble an 18 soldier meal module providing a complete arctic meal.

TREATMENT GROUPS

Both batteries received an Arctic T Ration for breakfast and for dinner with care taken to ensure that the two batteries were served identical menus for the 10-day period. The Arctic T Ration menus and Caloric Supplement used are shown in Appendix B. Soldiers in B Battery received an MRE for lunch (T/MRE/T group) and constituted the control group for the experimental group which consisted of soldiers from A Battery who received an LLRP for lunch (T/LLRP/T group). The batteries were located at different sites which precluded the exchange of food items.

DATA COLLECTION

Data were gathered manually with minimal interference to field operations (Table 3). Most of the data were obtained through direct observation, questionnaires, and interviews. Anthropometric measurements (height, weight, and circumference) were done in a customary

fashion using scales and measuring tape. The body fluids collected were urine from all the subjects, and blood and saliva samples in a subsample of 20 subjects from the T/MRE/T group.

Table 3. Data Collection Schedule

	Test Day[1]												
	-5	-1	1	2	3	4	5	6	7	8	9	10	11
Meteorological Data			X	X	X	X	X	X	X	X	X	X	
POMS/ESQ	X	X				X				X			X
Diet History		X											
% Body Fat		X											X
Body Weight		X											X
Height		X											
Food/Fluid Intake			X	X	X	X	X	X	X	X	X	X	
Ration Acceptability			X	X	X	X	X	X	X	X	X	X	
Activity Patterns[2]			X	X	X	X	X	X	X	X	X	X	
Urine Analysis			X	X	X	X	X	X	X	X	X	X	
Gastrointestinal Illness			X	X	X	X	X	X	X	X	X	X	
Human Factors													X
Nitrogen Balance[3]											X		
Blood Chemistry[3]		X											X
Energy Expenditure[3]		X[4]	X	X	X	X	X	X	X	X	X	X	X[4]

[1]Data collection D+1 thru D+10.

[2]Activity monitors: Subsample of 13 subjects from the T/MRE/T group and 12 subjects from the T/LLRP/T group (D+1 thru D+9).
Activity diaries: Subsample of 21 subjects from the T/MRE/T group and 12 subjects from the T/LLRP/T group (D+1 thru D+10).

[3]Subsample of 20 subjects from the T/MRE/T group.

[4]Doubly labeled water dosing.

Meteorological Data

Meteorological data that included temperature, wind chill, relative humidity, solar radiation, and precipitation were recorded daily by the Atmospheric Science Laboratory, Alaska Meteorological Team at Fort Greely.

Psychophysiological Surveys

Extended experience with caloric deficits or vitamin/mineral deficiencies leads to profound changes in mental and physical health (14). Research has systematically demonstrated that chronic vitamin/mineral deficiencies, even small ones, reduce worker productivity and impair the immune system (15). What is not as well-understood is whether short-term deficits affect health and performance. However, even minor fatigue or forgetfulness can endanger soldiers working at tasks which demand consistent strength and vigilance. Symptoms such as feeling lightheaded, nausea, blurred vision, clumsiness, and inability to concentrate are all indicators of dysfunction in the central nervous system. These psychophysiological symptoms are well-established predictors of industrial and military accidents (16). Similarly, mood states such as frustration, anger, and anxiety can impair judgement or motivation and thus compromise safety.

The Environmental Symptoms Questionnaire (ESQ) (Appendix C) and the Profile of Mood States Questionnaire (POMS) (Appendix D) were administered on D-5 in order to familiarize the soldiers with them. These questionnaires were administered again on D-1, D+4, D+8 and D+11, prior to the breakfast meal. The ESQ (17,18) is a 68-question inventory of symptoms that may occur at environmental extremes, arctic weather included. The intensity of the symptoms is rated on a 6-point scale allowing for reliable identification of individuals suffering from the effects of adverse climate. The POMS (17,19) measures mood state and is sensitive to the effects of food constituents. It consists of 65 adjectives, rated on a 5-point scale, yielding information concerning seven factors: Friendliness, Fatigue-Inertia, Vigor-Activity, Confusion-Bewilderment, Anger-Hostility, Tension-Anxiety, and Depression-Dejection. Both questionnaires were administered concurrently.

In order to highlight differences between the groups the psychophysiological data were collapsed into a presence/absence format: a rating of one or higher was treated as an indication that the symptom was present. Then the percent of soldiers in each group which rated a symptom as present was computed for each item.

Diet History

The short version of the Health Habits and Diet History Questionnaire (20) (Appendix E) was used to assess the subjects' usual dietary intake and to determine if ration consumption during the field test correlated with the test subjects' usual dietary consumption. The questionnaire contains an open-ended food frequency section of 60 food items, yielding a semi-quantitative measurement over a period of one year. Food frequency and portion size information was obtained from NHANES II (21), and the nutrient analysis is based on the USDA Data Base and the revised edition of Handbook No. 8 (20). The validity and reliability of this questionnaire, produced by Gladys Block for the National Cancer Institute (NCI), have been previously substantiated (20,22,23,24,25).

Prior to the beginning of the data collection period (D-1), the questionnaire was self-administered. The test subjects were verbally instructed on how to complete the questionnaire, as recommended by Sobel et al. (22), using the directions provided in the Health Habit and History Questionnaire manual. A data collector was available for assistance and for reviewing each questionnaire for completeness. If the questionnaire was answered incompletely or inconsistently, the subject was contacted as soon as possible during the test and requested to verify his answers

The recommended guidelines for coding, validating, and analyzing the data were followed, and the NCI software packet was used for the dietary intake analysis of each subject. Contradictory data were flagged by the Diet Edit portion of the software program, and several subjects were dropped based on the guideline of "too few foods consumed" or "too many foods skipped", which would have resulted in a deceptive description of nutrient intake.

Anthropometric Measurements

Height was determined on D-1 while the subject stood, without shoes or hat, pressing his back and heels against a wall. Body weight and percent body fat were determined on D-1 and D+11. Body weight was taken before breakfast using a Seca digital battery operated scale (accurate to $\pm$ 0.05 kg). The subjects were dressed in undershorts and socks. Percent body fat was determined using circumference measurements at neck and abdomen, as described in AR 600-9 (26), using the following equation:

$$\%\ \text{Body Fat}_{\sigma} = 46.89 - [68.68 \times \text{Log}(\text{height}_{cm}) + (76.46 \times \text{Log}(\text{abdominal circumference}_{cm} - \text{neck circumference}_{cm})]$$

Food and Fluid Intake

Daily food consumption from the breakfast and dinner meals (Arctic T) was determined by trained data collectors using a validated modified visual estimation technique (27,28). An example of the form used to collect food and fluid consumption is shown in Appendix F. In brief, each subject received a standard food tray which was assembled in a central distribution tent under the supervision of a data collector who ensured portion size standardization. Upon completion of the meal, the subjects presented their meal tray to a data collector who recorded the amount of food uneaten based on a model standard food tray. Total Arctic T Ration food consumption for the breakfast and dinner meals was later calculated from these data.

The test subjects were instructed on the use of the Diet Logs to self-report the lunch meal (MRE or LLRP), any snacks consumed, and water/fluid intake (Appendix G). The Diet Logs have been used on previous studies to determine intake of individual rations, between meal snacks, and fluid (13,29). At the breakfast meal, the completed Diet Logs for the previous 24-hours were collected by the data collectors who reviewed them for correctness and completeness. A new Diet Log, for the following 24-hours, was issued at that time.

Ration Acceptability

Daily acceptability of food items included in the MRE, LLRP and Arctic T rations was determined using a nine point hedonic scale in which 9 corresponded to "like extremely", 5 corresponded to "neither like or dislike", and 1 corresponded to "dislike extremely". The subjects rated the MRE or LLRP food items on the 24-hour Diet Logs (Appendix G) used to record lunch, snacks, and fluid intake. Breakfast and dinner meal (Arctic T Ration) ratings were obtained from the T Ration acceptability questionnaires completed by the subjects (Appendix H).

Urine Analysis

A sample (50 mL) of the first morning urine void was collected daily (beginning D-1) in screw-top conical tubes. Urine was analyzed for ketones. glucose, and specific gravity using a Behring Rapimat II/T[3].

[3]Behring Diagnostics, Inc., 17 Chubb Way, Sommerville, NJ 08876

Activity Patterns

Activity monitors and daily activity diaries were used to determine activity patterns of the T/MRE/T and T/LLRP/T groups. The activity monitors were worn by 13 subjects from the subsample of 20 belonging to the T/MRE/T group and 12 subjects from the T/LLRP/T group, while daily activity diaries were kept by 21 subjects from the T/MRE/T group and 12 from the T/LLRP/T group.

Activity Monitors. Activity monitors[4] (actigraphs) were used to identify periods of physical activity and inactivity (30,31) during nine days of the 10-day test period. The monitor was a compact (6.4x8.9x1.9 cm), lightweight (90 g), microprocessor-based unit which was attached to the non-dominant wrist of the subject and measured movement of that wrist. These monitors did not restrict the subjects' normal range of motion nor interfere with training activities. The output of the wrist monitor's piezoelectric motion sensor was recorded in a continuous series of one minute epochs for nine consecutive days (the actigraph's memory capacity prevented the monitors from storing data for the entire duration of the test). The monitors were retrieved at the end of the test and the stored activity data were down-loaded via an interface to a lap-top computer.

An algorithm for differentiating inactivity and activity from wrist activity monitor data was used to distinguish the activity data,

$$S=(-0.001)A_{-5}+(-0.001)A_{-4}+(-0.001)A_{-3}+(-0.001)A_{-2}+(-0.003)A_{-1}+(0.007)A_0+(-0.001)A_1+(-0.001)A_2+1.004.$$

The A_i's represent actigraphic measures for a completed minute epoch. Thus, A_{-3} is the measure for the one minute epoch completed three minutes ago. The activity/inactivity criterion is such that, if $S<0.5$, then A_0 is scored as active; if $S\geq 0.5$, then A_0 is scored as inactive.

Daily Activity Diaries. An example of the diary card is shown in Appendix I. Time of day, in one hour periods (0100 - 2400 hours), is listed vertically on the left margin and activity intensities (sleep, very light, light, moderate, heavy) are listed horizontally across the top of the activity diary. Examples of a variety of activities that subjects could have been doing and their corresponding intensities are listed on the back of the diary card. Subjects

[4]Actigraph, Ambulatory Monitoring, Inc., Ardsley, NY 10502.

were instructed to use their own best judgement to assign an intensity to activities that were not listed on the card.

Gastrointestinal Illness

The incidence of gastrointestinal and other food related illnesses associated with the rations was determined by monitoring the frequency of sick call visits and from using specific questions on the final questionnaire (Appendix J).

Human Factors

Two questionnaires, one for the T/MRE/T group and another for the T/LLRP/T group (Appendix J), were developed by the Soldier Science Directorate of the Natick, Research, Development and Engineering Center to assess human factors issues of the MRE, LLRP, and Arctic T rations. Both questionnaires contained similar questions assessing subjects' opinions of their respective rations in terms of acceptability and human factors issues, as well as collecting information on demographics and field conditions. These questionnaires were administered on the last day of the test (D+11).

Sub-test Data Collection

Since the MRE is the standard operational ration, and it has been studied extensively in a cold environment (1,2,12,13), a subsample of 20 subjects from that group (T/MRE/T) was selected to participate in the energy expenditure sub-test. Further, to ensure unit cohesion and ease of monitoring, the subjects were selected from the same platoon.

Nitrogen Balance. To assess protein status, the 20 subjects provided a 24-hour urine sample on D+9. Urine collection began with the first void on D+9. Total 24-hour urine volume was recorded, and an aliquot was frozen for later analysis of total nitrogen by the chemiluminescent method (Antek model 703 C Pyrochemiluminescent Nitrogen Analyzer[5]) (32).

Nitrogen balance was calculated from total nitrogen intake (protein intake$_{(g)}$ ÷ 6.25) for D+9, and nitrogen excretion (urinary N loss as recorded from urine samples and a factor of

[5]Antek Instruments, Inc Houston, TX 77076.

2.0 g for sweat and fecal losses). The equation used follows:

$$N_{BAL} = [(N\ Intake_{(g)}) - (Urine\ N\ Excretion_{(g)} + 2)]$$

Blood Chemistry. Blood chemistry assessment was performed on fasting blood samples (24 mL) drawn by venipuncture (without stasis) on D-1 and D+11. The subjects were seated and samples were taken from the antecubital vein and drawn into vacutainers. Blood samples were analyzed to determine changes in hydration and nutritional status. One 4 mL tube (EDTA) was used to determine hematocrit by centrifugation. Two 10 mL Serum Separator tubes (SST) were used for serum samples. The serum was transferred into 4.5 mL cryo tubes for storage (-40°F) and shipped to Pennington Biomedical Research Center, Louisiana State University, for analyses. The chemistry panel consisted of:

Lactate	Free Fatty Acid	Triglycerides	ß-Hydroxybutyrate
Glycerol	LDL-Cholesterol	NEFA	
Creatinine	HDL-Cholesterol	Urea Nitrogen (BUN)	
Glucose	Cholesterol	Protein, Total	

The chemistry panel was analyzed on a Beckman Synchron[6] instrument utilizing the system's routine and user definable chemistry modes.

Energy Expenditure. Energy expenditure was determined using the doubly labeled water ($^2H_2{}^{18}O$) technique (33,34). This method provides an accurate measure of energy expenditure in free-living subjects; preliminary validations of its utility for use in field studies were conducted in 1986 and 1988 (35,36). The doubly labeled water technique is based on the assumption that the two isotopes leave the body at different rates; deuterium (^2H) is lost exclusively as water (^2H_2O), while ^{18}O is lost as both water ($H_2{}^{18}O$) and expired carbon dioxide ($C^{18}O_2$). The difference in the rates of loss of the two isotopes is an estimate of CO_2, which then is used to estimate energy expenditure using a metabolic fuel quotient.

Doubly labeled water dosing to estimate energy expenditure and pre-test total body water (TBW) was done on D-1. Ten subjects were given the labeled water to determine energy expenditure. The other ten subjects were given an equal volume of distilled water in place of the isotope solution and constituted a placebo group. Saliva and urine samples from the placebo group were used to correct samples for changes in background isotope abundances.

[6]Beckman Instruments, Inc., Brea, CA 92621.

These 20 subjects were asked to not eat or drink anything (including water) after 2100 hours the night preceding the dosing. On the morning the isotope solutions were administered, the subjects were not permitted to eat or drink, smoke tobacco products, or chew gum or tobacco until the saliva sample collections were completed (approximately 4 hours post-dosing). Each subject was weighed (shorts and socks only), and then provided a 4 mL saliva sample (baseline) using a clean, dry, screw-top tube.

On D-1, the ten subjects in the doubly labeled water group were given a solution to drink which provided 0.25 g $H_2{}^{18}O$ (Isotec Inc., Miamisburg, OH) and 0.12 g ^2H_2O (MSD Isotopes, St. Louis, MO) per kg total body water (total body water estimated to be 60% of body weight) in a total volume of less than 150 mL. On day D+11, these same subjects were given a solution which provided 0.09 g $H_2{}^{18}O$ and 0.08 g ^2H_2O per kg total body water in a volume of less than 50 mL. This second dosing was to determine the subjects' post-test total body water (TBW). Additionally, each subject consumed a volume of distilled water equal to approximately one-half the dosing solution volume as a rinse of the dosing solution containers. The subjects provided two additional (4 mL each) saliva samples, one at 3 hours and one at 4 hours post-dosing to ensure that the isotopes had equilibrated in the body water pool.

The abundances of both isotopes were measured with an isotope ratio mass spectrometer in Pennington Biomedical Research Center, Louisiana State University. Total body water was calculated from ^{18}O enrichments in 3- and 4-hour saliva samples using the formula (37):

$$TBW = (A \div MW_d)(APE_d \div 100)\ 18.02\ \{1 \div [R_{std}(E_s - E_p)]\}(1/1.01)$$

where:

A = dose in grams

MW_d = molecular weight of dose water

APE_d = atom percent excess enrichment of dose water

R_{std} = ? 005 x 10^{-3}, the ratio of heavy to light isotope of SMOW

E_s = the per mil (‰) enrichment of the final sample

E_p = the per mil (‰) enrichment of the predose sample

1/1.01 = used to adjust for the difference between actual TBW and the ^{18}O *dilution space* (35)

The rate of CO_2 production was calculated using:

$$rCO_2 = (N \div 2.078)(1.01k_O - 1.04k_H) - 0.0246rH_2O_f$$

where:

rCO_2 = rate of CO_2 production in mol

N = average of initial and final TBW measurements

k_O = $H_2{}^{18}O$ elimination rate

k_H = ^2H_2O elimination rate

rH_2O_f = rate of fractionated evaporative water loss estimated as $1.05N(1.01k_O - 1.04k_H)(35)$

The isotopic elimination rates for ^2H and ^{18}O were calculated by the two point method using the equation:

$$k = [\ln (\delta_i - \delta_b) - \ln (\delta_f - \delta_b - \Delta\delta_c)]/t$$

where:

k = isotopic elimination rate

δ_i = initial isotopic abundance (‰)

δ_b = *pre-dose baseline* isotopic abundance (‰)

δ_f = final isotopic abundance (‰)

$\Delta\delta_c$ = corresponding change in the mean baseline isotopic abundance (‰) in the placebo group (n=10)

t = the time between the initial and final samples of the energy expenditure period

NUTRIENT INTAKE

The visual estimation sheets and the 24-hour Diet Logs were used to calculate the subjects' nutritional intake (energy, protein, carbohydrate, fat, thiamin, riboflavin, niacin, vitamin B_6, Ca, P, Mg, Fe, and Na; other nutrients were not included in the analysis because of incomplete nutrient composition data base) using the Computerized Analysis of Nutrients (CAN) System (38) developed by USARIEM. The caloric distribution of the rations consumed (percent of the calories provided by carbohydrate, protein and fat) was determined.

NUTRITIONAL AND HYDRATION STATUS

The nutritional status was assessed using data from body weight change, urinalysis, blood chemistry and nitrogen balance. The hydration status was estimated from the urine specific

gravity (SG).

STATISTICAL ANALYSIS

The data were statistically analyzed (39) using the BMDP (40) and SPSS-X (41) on a Digital Equipment Corporation VAX 780 or a Compaq 286e computer. A $p \leq 0.05$ was considered statistically significant. Repeated measures ANOVA, in particular BMDP2V, BMDP5V and SPSS-X MANOVA, were the primary data decomposition procedures. Between group day differences or meal differences were assessed using standard two group t-test procedures, whereas within group, day or meal comparisons used the paired t-test procedures. Within the repeated measures analysis of nutrient intake differences between groups, across meals, within days, special contrasts were used to assess the difference between lunch intake and the average of breakfast and dinner intake, and to compare breakfast to dinner intake. This was done in BMDP2V using all subjects for which there were complete records (a necessary condition for most repeated measures analysis). BMDP5V, which is tolerant of missing data for a general repeated measures analysis but is not as sophisticated as BMDP2V for contrast analysis, was used to provide assurance that the subjects with missing data were similar to those with complete records.

Physical activity patterns were used to rule out the possibility of gross differences between the groups, invalidating the group comparisons. Activity monitor data were analyzed for total hours of inactivity (sleep) per day, per group. Activity diary card data were analyzed for total hours of sleep (inactivity) and wakefulness (activity) per day, per group. Diary card data were compared to the activity monitor data.

The following differences between the T/MRE/T and T/LLRP/T groups were analyzed: food intake, body weight changes, percent body fat changes, and hydration status. The nutritional intake of the T/MRE/T and T/LLRP/T groups was compared with the MRDA (9). The subjects' pre- (D-1) and post- (D+11) test body weight and percent body fat, and blood chemistry for the subsample were compared using the paired t-test procedure. Further, the two groups (MRE and LLRP) were compared for ration acceptability and human factors aspects using the t-test.

The mood states and self reported symptoms of environmental stress were compared between groups using the chi square test.

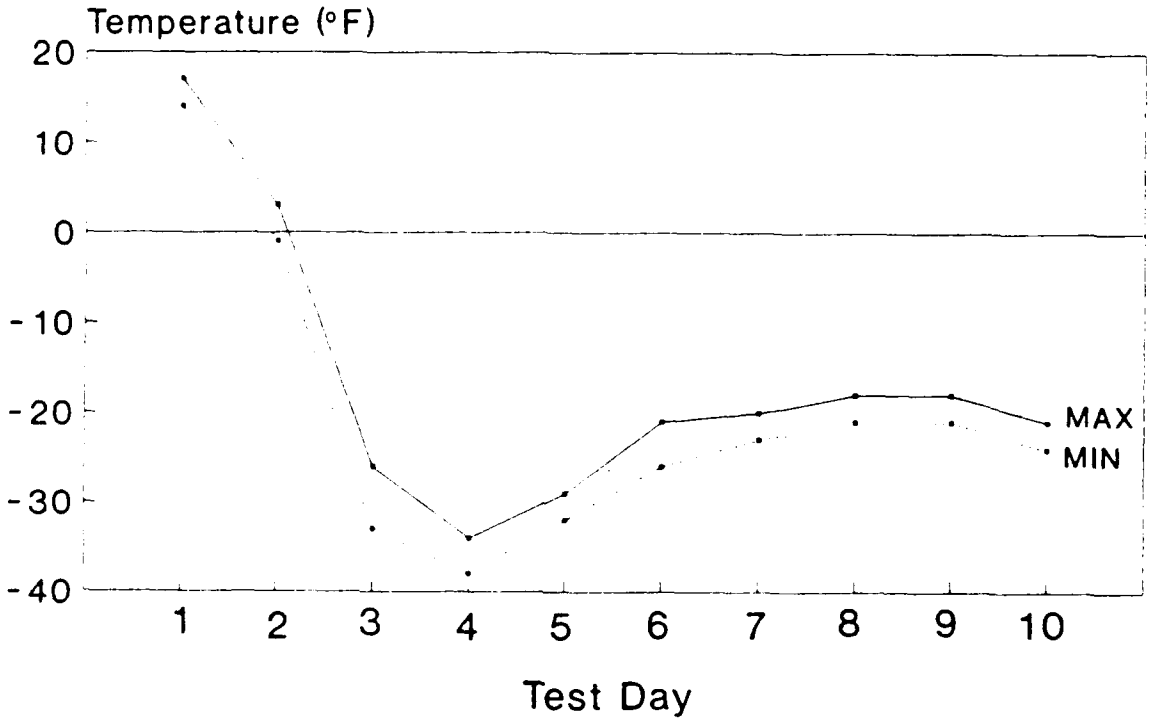
Descriptive data were obtained on energy expenditure and nitrogen balance providing a data base on the effect of field operations in cold weather on these variables when the subjects were exposed to this extreme environment.

RESULTS

METEOROLOGICAL DATA

The meteorological data presented are an average of the hourly reports at Fort Greely (elevation 1306 feet, latitude 63.60°, longitude 145.47°). Figure 1 summarizes the daily maximum and minimum temperatures during the test period. Temperatures ranged from a maximum of +17°F (Day 1) to a minimum of -38°F (Day 4). Wind chill further decreased the minimum temperature by approximately 2°F for the first four days of the test. Thereafter, the wind chill factor did not affect the temperatures recorded.

Figure 1. Daily Temperatures



Other meteorological data are summarized in Table 4. The average relative humidity was 64.5 percent, ranging from 59 to 73 percent. Solar radiation ranged from 4 to 59 Langleys. Daylight hours during the test were approximately seven hours per day.

Table 4. Meteorological Data Summary

	Test Day									
	1	2	3	4	5	6	7	8	9	10
Average Temperature (°F)	15	1	-31	-37	-31	-24	-22	-19	-19	-22
Relative Humidity (%)	66	73	62	59	61	63	65	67	65	64
Solar Radiation (Langley)	4	28	59	52	35	26	14	21	55	40
Precipitation (inches)	0	0	0	0	0	0	0	0	0	0

TEST SUBJECTS

Test subjects' ethnicity was varied within groups, yet somewhat similar between groups. Ethnicity and regional origin for each group are shown in Table 5. Otherwise, subjects were not significantly different in respect to age, height, initial body weight, and initial percent body fat (Table 6).

Table 5. Test Subjects' Ethnic Background and Regional Origin

	T/MRE/T	T/LLRP/T
Ethnic Background	%	%
White	49.0	59.5
Black	35.3	26.2
Hispanic	7.8	11.9
Asian	3.9	0
American Indian	3.9	2.4
Regional Origin[1]	%	%
New England	5.9	2.4
Middle Atlantic	15.7	9.5
South Atlantic	15.7	11.9
North Central	19.6	19.1
South Central	19.6	38.1
Mountain	11.8	4.8
Pacific	9.8	11.9
Non-Specific	2.0	2.4

[1]Part of the United States in which the subject lived the longest before 16 years of age.

Table 6. Test Subjects' Description

	T/MRE/T	T/LLRP/T
n	51	45
Sex	M	M
Age, Median / Range (yrs)	24 / 18-39	23 / 18-38
Height (cm)	174.0	176.0
Initial Weight (kg)	78.4	79.6
Initial Body Fat (%)	16.7	17.2

DIET HISTORY

The diet history questionnaire was completed by 49 T/MRE/T subjects and all (n=45) T/LLRP/T subjects. Based on the Diet Edit evaluation (20), only 46 (94 percent) of the T/MRE/T and 35 (78 percent) of the T/LLRP/T group could be considered for diet history analysis. The dietary intake analysis revealed a similar nutrient intake between the T/MRE/T and T/LLRP/T groups (Table 7). However, both groups' usual intake was considerably different from the Military Recommended Dietary Allowance (MRDA) (9) as indicated by the percent of recommendations consumed.

Table 7. MRDA and Subjects' Usual Dietary Consumption[1,2]

	Unit	MRDA[3]	T/MRE/T	%[4]	T/LLRP/T	%[4]
			n = 46		n = 35	
Energy	Kcal	**4500**	3927 ± 225	87	3859 ± 272	86
Protein	g	**100**	153 ± 10	153	149 ± 11	149
Carbohydrate	g	**619[5]**	407 ± 24	66	405 ± 35	65
Fat	g	**175[6]**	168 ± 11	96	173 ± 13	99
Vitamin C	mg	**60**	303 ± 26	505	266 ± 27	443
Vitamin A	IU	**5000**	12761 ± 1504	255	11168 ± 1192	223
Iron	mg	**10-18**	23 ± 1	164	24 ± 1	171
Calcium	mg	**800-1200**	1649 ± 148	165	1384 ± 127	138

[1]Includes alcohol consumption which contributed 256 Kcal for the T/MRE/T group and 140 Kcal for the T/LLRP/T group.
[2]Mean ± SEM. [3]Military Recommended Dietary Allowances for males (≥ 17 years old) exposed to a cold environment (< 57.2°F).
[4]Percent of MRDA usually consumed. [5]Although there is no MRDA for carbohydrate, military feeding guidelines suggest 50 to 55 percent of the energy intake to be from carbohydrate (9). [6]Although there is no MRDA for fat, military feeding guidelines suggest 35 to 40 percent of the energy intake to be from fats in a cold environment (9).

The subjects' usual caloric distribution was similar for both groups as shown in Table 8. A comparison of the usual caloric distribution with the MRDA recommendations indicates that the subjects' usual intake is lower in carbohydrate, and higher in protein and fat compared to military feeding guidelines.

Table 8. Caloric Distribution of MRDA and Subjects' Usual Dietary Consumption[1]

	MRDA[2]	T/MRE/T	T/LLRP/T
	%	%	%
Protein	**9**	15.6	15.4
Carbohydrate	**50-55**	41.5	41.9
Fat	**35-40**	38.5	40.3
Alcohol	-	6.5	3.6

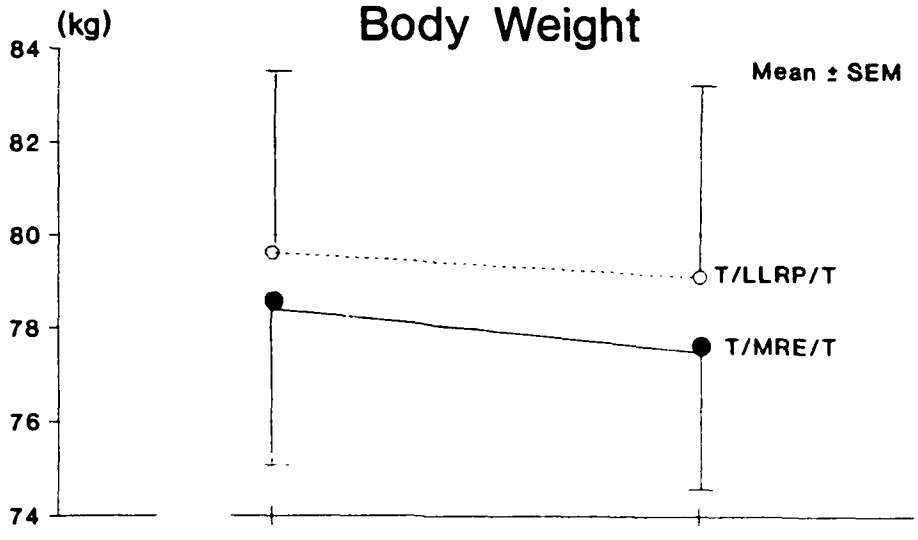
[1]Percentage of calories from the macro-nutrients (carbohydrate, protein and fat) and alcohol. Percentages do not add up to 100 due to rounding.
[2]Military Recommended Dietary Allowances for males (≥ 17 years old) exposed to a cold environment (< 57.2°F).

BODY WEIGHT AND PERCENT BODY FAT CHANGES

Both groups lost a similar amount of body weight (Mean ± SEM; 1.97 ± 0.36 kg and 1.06 ± 0.40 kg for T/MRE/T and T/LLRP/T, respectively) during the 10-day test period (Figure 2). This difference was not significantly different between groups. Although the weight loss was small (1.1 percent for the T/MRE/T group and 0.6 percent for the T/LLRP/T group), it was significantly ($p \leq 0.05$) decreased over the 10-day test period for each group.

The percent body fat change was significantly less for the T/LLRP/T group (Mean ± SEM; 1.42 ± 0.13 and 0.69 ± 0.13 kg for T/MRE/T and T/LLRP/T, respectively). There was also a significant ($p \leq 0.05$) decrease in percent body fat within groups (10.6 and 4.9 percent for the T/MRE/T and T/LLRP/T groups, respectively).

Figure 2. Pre and Post-Test Body Weight and Percent Body Fat



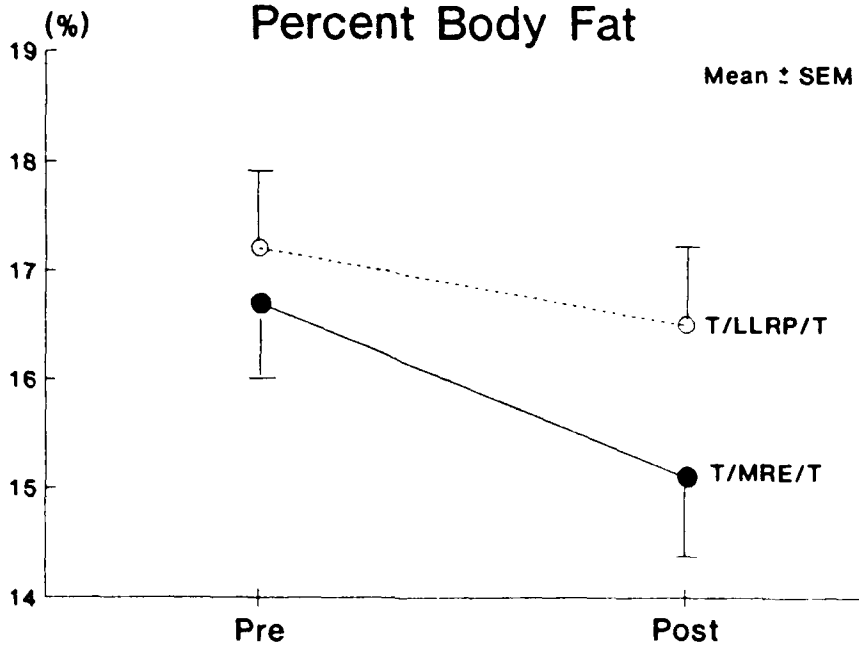
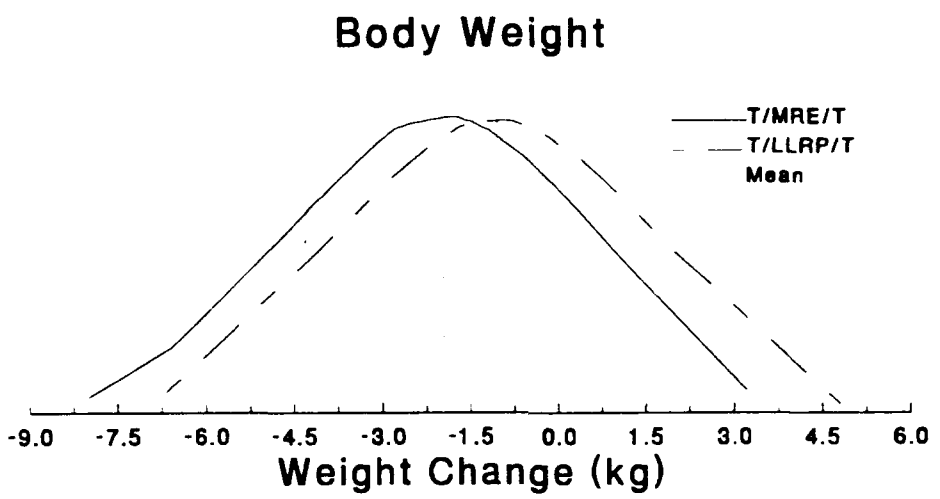
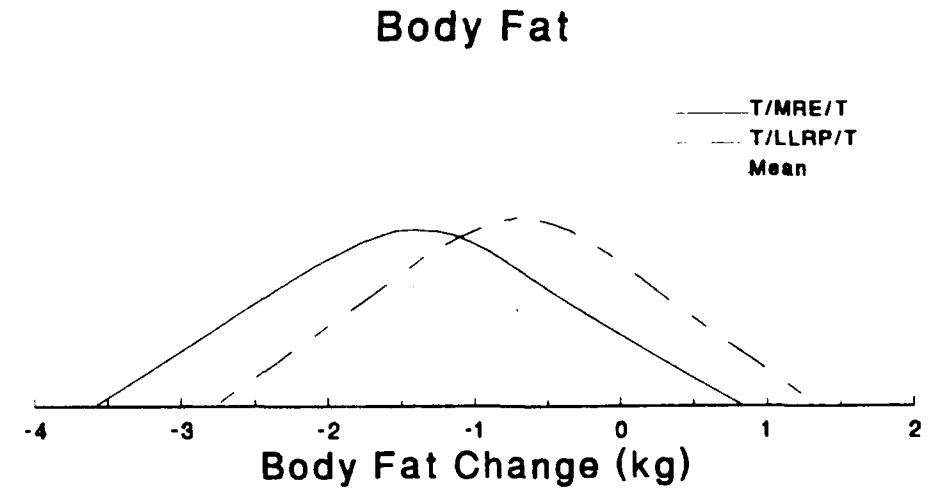


Figure 3 shows the range of weight loss and change in body fat during the 10-day test. The distributions were normal for both groups.

Figure 3. Change in Body Weight and Body Fat





Data in Table 9 (from the final questionnaire) show that approximately half of the soldiers were trying to lose or gain weight. In the T/MRE/T group, fewer subjects were trying to lose weight than in the T/LLRP/T group.

Table 9. Summary of Subjects Who were Trying to Lose or Gain Weight

Trying to	T/MRE/T	T/LLRP/T
	%	%
Lose Weight	25.5	26.8
Gain Weight	25.5	14.6

TEST RATIONS (MENU)

The nutrient composition of the rations provided during the test are shown in Appendices K, L, and M, for the Arctic T, MRE and LLRP, respectively. The menus (T/MRE/T and T/LLRP/T) provided during the 10-day test provided similar amounts of nutrients, surpassing the Nutritional Standards for Operational Rations (NSOR)(9)(Table 10).

Table 10. Mean Daily Nutrient Provision of Test Menus[1,2]

	Unit	T/MRE/T	%NSOR[3]	T/LLRP/T	%NSOR
Energy	Kcal	6473 ± 54	180	6571 ± 54	183
Protein	g	224.8 ± 2.7	225	215.0 ± 2.7	215
Carbohydrate	*g*	*846 ± 11*	*192*	*889 ± 11*	*202*
Fat	g	243 ± 5	152[4]	239 ± 5	149[4]
Thiamin	mg	14.63 ± 0.10	813	13.00 ± 0.10	722
Riboflavin	mg	4.67 ± 0.06	212	4.53 ± 0.06	206
Niacin	mg NE	51.04 ± 1.92	213	53.44 ± 1.92	223
Vitamin B_6	mg	6.61 ± 0.11	300	5.41 ± 0.11	246
Calcium	mg	*2155 ± 86*	*269*	*2002 ± 86*	*250*
Phosphorus	mg	3849 ± 60	481	3705 ± 60	463
Magnesium	mg	741 ± 9	185	750 ± 9	187
Iron	mg	35.2 ± 1.0	196	35.4 ± 1.0	297
Sodium	mg	12221 ± 193	175[4]	12736 ± 193	182[4]

[1]Mean ± SEM; n=10 menus.
[2]*T/MRE/T includes Arctic T Breakfast, MRE Lunch and Arctic T Dinner* while T/LLRP/T includes Arctic T Breakfast, LLRP Lunch and Arctic T Dinner for the 10-day test period.
[3]Percent of Nutritional Standards for Operational Rations (NSOR) provided by menu.
[4]From the maximum amount allowed.

In spite of the incomplete nutrient composition data base (missing data on > 20 percent of the menu items)(Appendix N), the NSOR for vitamin A, vitamin E, ascorbic acid, vitamin B_{12}, and zinc were met, indicating that in reality the menu provided at least the quantity of nutrients shown in Table 11.

Table 11. Mean Daily Nutrient Provision of Test Rations Using Incomplete Nutrient Data[1,2,3]

	Unit	T/MRE/T	%NSOR[4]	T/LLRP/T	%NSOR[4]
Vitamin A	IU	18772 ± 865	375	16537 ± 865	331
Vitamin E	mg TE	25.7 ± 0.9	257	24.8 ± 0.9	248
Ascorbic Acid	mg	391 ± 12	652	347 ± 12	578
Vitamin B_{12}	mcg	5.49 ± 0.13	183	4.77 ± 0.13	159
Folic Acid	mcg	389.1 ± 13	97	354.0 ± 13	89
Zinc	mg	22.20 ± 1.20	148	23.19 ± 1.20	155

[1]Nutrient with missing data on > 20 percent of the menu items.
[2]Mean ± SEM; n=10 menus.
[3]T/MRE/T includes Arctic T Breakfast, MRE Lunch and Arctic T Dinner while T/LLRP/T includes Arctic T Breakfast, LLRP Lunch and Arctic T Dinner for the 10-day test period.
[4]Percent of Nutritional Standards for Operational Rations (NSOR) provided by menu.

Even though the nutrient content of each menu was considerably higher than the NSOR, their caloric distribution was fairly close to the protein, carbohydrate, and fat recommendations (Table 12).

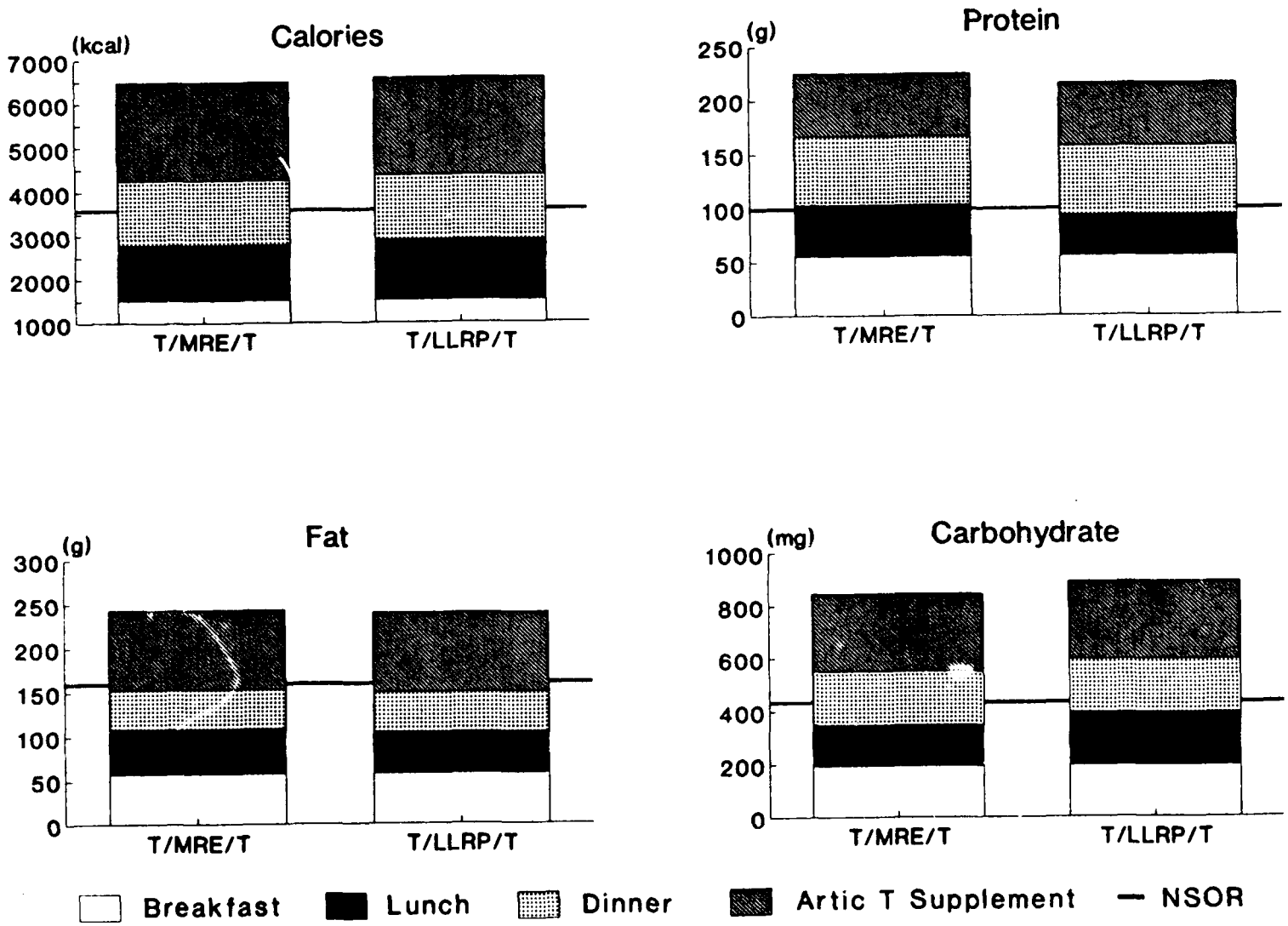
Table 12. Caloric Distribution of Menu[1]

	NSOR[2]	T/MRE/T	T/LLRP/T
	%	%	%
Protein	11	14	13
Carbohydrate	49	52	54
Fat	40	34	33

[1]Percent energy provided by macronutrients.
[2]Nutritional Standards for Operational Rations (NSOR).

To further assess the nutrient contribution of each meal, their caloric, protein, carbohydrate, and fat content were broken down into breakfast, lunch, dinner and caloric supplement (Figure 4).

Figure 4. Meal Breakdown of Menu



NUTRIENT INTAKE

The mean daily nutrient intakes presented in this section were calculated from those subjects who did not have any missing data (n=37 for T/MRE/T and n=32 for T/LLRP/T) using the BMDP2V statistical program (Table 13). Means which include missing data, calculated using the BMDP5V, are presented in Appendix O. Meals skipped are discussed elsewhere in this report, but are included in these data as zero intake.

The intake of several nutrients was significantly ($p \leq 0.05$) different between groups (protein, fat, thiamin, riboflavin, vitamin B_6, calcium, phosphorus, and iron) with the T/LLRP/T group being consistently lower than the T/MRE/T group. However, these differences are of no nutritional consequence except for those nutrients that did not meet the MRDA (energy and vitamin B_6). Energy intake was low for both groups, while vitamin B_6 was considerably lower for the T/LLRP/T group than for the T/MRE/T group. In spite of the low fat intake and incomplete cholesterol data (Appendix N), the cholesterol intake for the T/MRE/T group was 415 mg, and 274 mg for the T/LLRP/T group. This implies that the actual cholesterol intake was even higher than the amount recorded, thus exceeding the Committee on Military Nutrition Research recommendations of no more than 300 mg/d (42). Even for most of the other nutrients with incomplete data (Appendix N) (vitamin A, vitamin E, ascorbic acid, and vitamin B_{12}) the MRDAs were also met.

Energy and macronutrient comparisons were made between rations by group, and between meals by group. The results are shown in Tables 14 through 22. In these tables, means with different letter superscripts within a row are significantly ($p \leq 0.05$) different between meals, while means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups.

Table 13. Military Recommended Dietary Allowances and Mean Daily Nutritional Intake[1]

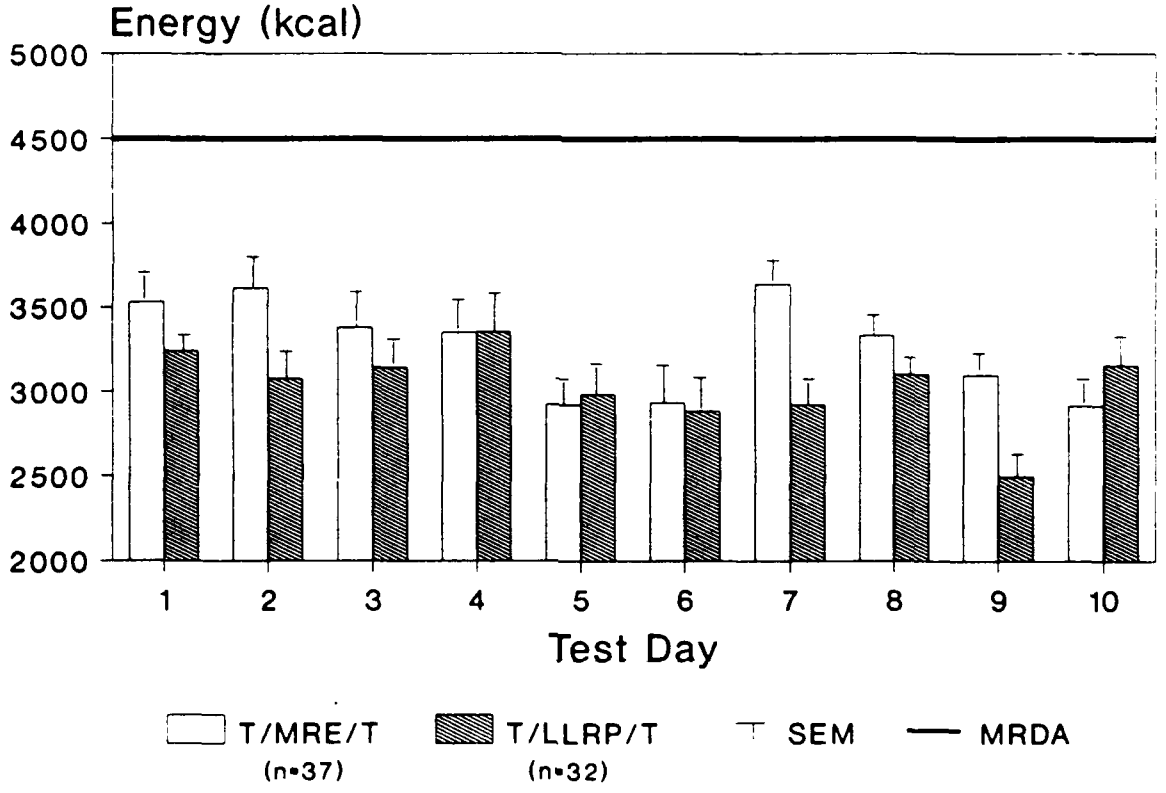
	Nutrient[2]	Unit	MRDA[3]	T/MRE/T (n=37)	%MRDA	T/LLRP/T (n=32)	%MRDA
	Energy	kcal	**4500**	3271 ± 144	73	3035 ± 106	67
*	Protein	g	**100**	134.3 ± 5.0	134	110.6 ± 3.4	111
	Carbohydrate	g	**619**[4]	375 ± 19	61	376 ± 16	61
*	Fat	g	**175**[5]	138 ± 6	79	123 ± 4	70
*	Thiamin	mg	**1.6**	3.79 ± 0.30	237	1.90 ± 0.10	119
*	Riboflavin	mg	**1.9**	3.08 ± 0.10	162	2.50 ± 0.10	132
	Niacin	mg NE	**21**	26.87 ± 0.86	128	27.60 ± 1.11	131
*	Vitamin B_6	mg	**2.2**	2.13 ± 0.15	97	1.27 ± 0.06	58
	Calcium	mg	**800-1200**	1445 ± 57	145	1107 ± 53	111
*	Phosphorus	mg	**800-1200**	2119 ± 79	212	1787 ± 59	179
	Magnesium	mg	**350-400**	374 ± 15	100	361 ± 14	96
*	Iron	mg	**10-18**	18.71 ± 0.66	134	17.11 ± 0.54	122
	Sodium	mg	**5500**[6]	5846 ± 286	106	5651 ± 234	103

[1]Mean ± SEM.
[2]Values with asterisk (*) indicate statistically significant difference ($p \leq 0.05$) between groups.
[3]*MRDA for males ≥ 17 years old, for a cold environment (< 57.2°F) (9).*
[4]Although there is no MRDA for carbohydrate, military feeding guidelines suggest 50 to 55 percent of the energy intake to be from carbohydrate (9).
[5]Although there is no MRDA for fat, military feeding guidelines suggest 35 to 40 percent of the energy intake to be from fats in a cold environment (9).
[6]Maximum amount allowed.

Energy Intake

The energy intake (kcal) of both groups was similar and about 70 percent of the energy MRDA (77 percent of the energy expenditure as shown in Table 37). This deficit was basically due to a low food intake reflected by low carbohydrate and fat consumption; however, protein intake was adequate. The mean energy intake varied from one day to another, between and within groups. No particular trend could be detected (Figure 5).

Figure 5. Mean Daily Energy Intake



Energy consumption from each ration shows that, overall, subjects in the T/LLRP/T group consumed less ($p \leq 0.05$) of the Arctic T ration (breakfast, dinner and supplement) than those in the T/MRE/T group did (Table 14). A further breakdown of energy intake by meals demonstrates that this difference was due to a lower ($p \leq 0.05$) intake at breakfast time for T/LLRP/T (Table 15). Within group meal energy intake was fairly consistent for the T/MRE/T group, while the T/LLRP/T group's biggest ($p \leq 0.05$) energy contributor was the lunch meal.

Table 14. Energy Intake by Ration

		Energy Intake[1,2]			
	n	Arctic T	MRE	LLRP	Total
T/MRE/T	37	2213 ± 92	1058 ± 92	-	3271 ± 144
T/LLRP/T	32	1853 ± 76*	-	1182 ± 77	3035 ± 106

[1]Calories per day; Mean ± SEM.

[2]Means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups.

Table 15. Energy Intake by Meals[1]

		Energy Intake[2,3,4]			
	n	Breakfast	Lunch	Dinner	Total
T/MRE/T	37	1152 ± 58[a]	1058 ± 92[a]	1061 ± 41[a]	3271 ± 144
T/LLRP/T	32	884 ± 45*[b]	1182 ± 77[a]	969 ± 38[b]	3035 ± 106

[1]Arctic T supplement is included with the breakfast and dinner meals.

[2]Calories per day; Mean ± SEM.

[3]Means with different superscripts (a,b) within a row are significantly ($p \leq 0.05$) different from each other.

[4]Means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups.

The caloric distribution for both groups was similar and is presented in Table 16. Both groups had a higher than desirable percent of energy (kcal) provided by protein, while the amount of energy from carbohydrates was slightly less than optimal.

Table 16. Caloric Distribution of Rations Consumed[1]

	MRDA[2]	T/MRE/T	T/LLRP/T
	%	%	%
Protein	9	16	15
Carbohydrate	50-55	46	50
Fat	35-40	38	36

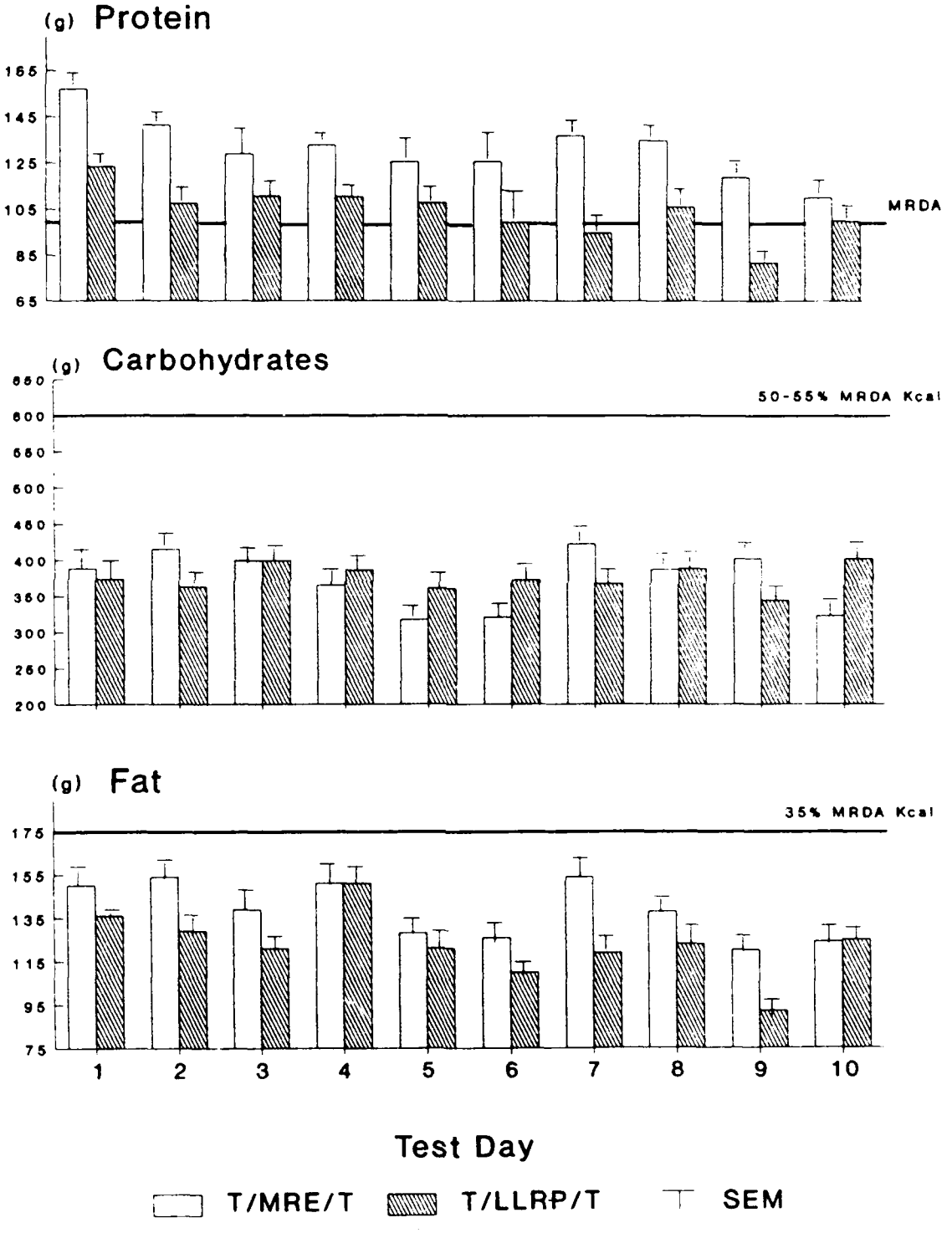
[1]Percent energy provided by macronutrients.

[2]Military Recommended Dietary Allowances for males ≥ 17 years old, in a cold environment (< 57.2°F).

Macronutrients

The total mean intakes for protein and fat were significantly ($p \leq 0.05$) less for the T/LLRP/T group than for the T/MRE/T group; carbohydrate intake was the same for both groups. Figure 6 shows the mean daily protein, carbohydrate, and fat intakes. The intake of these macronutrients varied from one day to another, by meal, and by group (between and within). No particular pattern of intake was detected.

Figure 6. Mean Daily Macronutrient Intake



Protein. The T/LLRP/T group's protein intake from the Arctic T Ration was less ($p \leq 0.05$) than the T/MRE/T group's intake (Table 17). Both groups had similar protein intake from their individual rations (MRE or LLRP). Between groups comparison shows that protein consumption for the T/LLRP/T group was lower ($p \leq 0.05$) at the breakfast and dinner meals than for the T/MRE/T group (Table 18). Within group comparison shows that the T/MRE/T group had a lower ($p \leq 0.05$) protein intake at lunch while the T/LLRP/T group had a low ($p \leq 0.05$) protein intake at the breakfast and lunch meals.

Table 17. Protein Intake by Ration

		Protein Intake[1,2]			
	n	Arctic T	MRE	LLRP	Total
T/MRE/T	37	95.7 ± 3.4	38.6 ± 3.1	-	134.3 ± 5.0
T/LLRP/T	32	76.0 ± 3.0*	-	33.6 ± 2.3	110.5 ± 3.4*

[1]Grams of protein per day; Mean ± SEM.
[2]Means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups.

Table 18. Protein Intake by Meals[1]

		Protein Intake[2,3,4]			
	n	Breakfast	Lunch	Dinner	Total
T/MRE/T	37	48.3 ± 2.1[a]	38.6 ± 3.1[b]	47.4 ± 1.5[a]	134.3 ± 5.0
T/LLRP/T	32	35.7 ± 1.9*[b]	33.6 ± 2.3[b]	41.2 ± 1.4*[a]	110.5 ± 3.4*

[1]Arctic T supplement included with the breakfast and dinner meals.
[2]Grams of protein per day; Mean ± SEM.
[3]Means with different superscripts (a,b) within a row are significantly ($p \leq 0.05$) different from each other.
[4]Means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups.

Carbohydrate. Carbohydrate consumption from the Arctic T Ration was lower ($p \leq 0.05$) for the T/LLRP/T group, however their intake at the lunch meal was higher ($p \leq 0.05$) than the T/MRE/T group's intake (Table 19). Meal breakdown shows that between groups the T/LLRP/T group had a significantly lower carbohydrate intake for breakfast and a higher

intake at lunch than the T/MRE/T group (Table 20). While the T/MRE/T group had a similar intake of carbohydrate for all meals, the T/LLRP/T group's carbohydrate intake was different ($p \leq 0.05$) for all meals, with lunch providing the most and breakfast providing the least amount.

Table 19. Carbohydrate Intake by Ration

		Carbohydrate Intake[1,2]			
	n	Arctic T	MRE	LLRP[3]	Total
T/MRE/T	37	245 ± 11	129 ± 12	-	374 ± 19
T/LLRP/T	32	206 ± 11*	-	169 ± 11	375 ± 16

[1]Grams of carbohydrate per day; Mean ± SEM.
[2]Means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups
[3]Carbohydrate intake from LLRP is significantly ($p \leq 0.05$) higher than for MRE.

Table 20. Carbohydrate Intake by Meals[1]

		Carbohydrate Intake[2,3,4]			
	n	Breakfast	Lunch	Dinner	Total
T/MRE/T	37	117 ± 7[a]	129 ± 12[a]	128 ± 5[a]	374 ± 19
T/LLRP/T	32	87 ± 6*[c]	169 ± 11*[a]	119 ± 5[b]	375 ± 16

[1]Arctic T supplement is included with the breakfast and dinner meals.
[2]Grams of carbohydrate per day; Mean ± SEM.
[3]Means with different superscripts (a,b,c) within a row are significantly ($p \leq 0.05$) different from each other.
[4]Means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups.

Fat. Fat intake from the Arctic T Ration was also lower ($p \leq 0.05$) for the T/LLRP/T group, while lunch intakes were similar (Table 21). Between group comparisons show a smaller ($p \leq 0.05$) intake for the T/LLRP/T group (Table 22). Within group comparisons show that both groups consumed more ($p \leq 0.05$) fat at breakfast than at the other meals.

Table 21. Fat Intake by Ration

		Fat Intake[1,2]			
	n	Arctic T	MRE	LLRP	Total
T/MRE/T	37	96 ± 4	43 ± 4	-	139 ± 6
T/LLRP/T	32	81 ± 3*	-	42 ± 3	123 ± 4*

[1]Grams of fat per day; Mean ± SEM.

[2]Means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups.

Table 22. Fat Intake by Meals[1]

		Fat Intake[2,3,4]			
	n	Breakfast	Lunch	Dinner	Total
T/MRE/T	37	56 ± 3^{a}	43 ± 4^{b}	40 ± 2^{b}	139 ± 6
T/LLRP/T	32	44 ± 2^{*a}	42 ± 3^{ab}	37 ± 2^{b}	123 ± 4*

[1]Arctic T supplement is included with the breakfast and dinner meals.

[2]Grams of fat per day; Mean ± SEM.

[3]Means with different superscripts (a,b) within a row are significantly ($p \leq 0.05$) different from each other.

[4]Means with an asterisk (*) within a column are significantly ($p \leq 0.05$) different between groups.

Vitamins

For the most part, the MRDA for fat soluble vitamins was exceeded, with the lowest intake being 93 percent of the MRDA for the T/LLRP/T group's vitamin A intake, even though the nutrient composition data base for this nutrient is incomplete (Appendix N). The amount of vitamin A provided by the Arctic T Ration was similar between groups, even though the breakfast intake was significantly ($p \leq 0.05$) less for the T/LLRP/T group. Therefore, the difference in vitamin A intake (124 versus 93 percent for the T/MRE/T and the T/LLRP/T groups, respectively) can be attributed to the decreased intake at lunch time in which the intake of the MRE and the LLRP were directly compared.

Among the water soluble vitamins, vitamin B_6 was below the MRDA. The deficit on vitamin B_6 is of consequence only for the T/LLRP/T group which consumed only 58 percent

(T/MRE/T group consumed 97 percent) of the MRDA. This deficit is a result of low ($p \leq 0.05$) intake of the Arctic T Ration especially at breakfast. Vitamin B_6 intake was lower ($p \leq 0.05$) for the T/LLRP/T group at lunch, a manifestation of the lower amount of vitamin B_6 in this ration (1.91 mg in MRE, 0.71 mg in LLRP, 1.55 in Arctic T Ration, and 3.16 mg in Caloric Supplement).

Minerals

The lowest mineral intake was for magnesium with 96 percent for the T/LLRP/T group (the T/MRE/T group had 100 percent).

Skipped Meals

There was a modest negative correlation ($r = -0.44$; $p \leq 0.01$) between food intake and number of meals skipped. Although, overall, there was no difference in the number of skipped meals between groups, there was a distinct pattern for which meals were skipped more often within the groups (Table 23). The T/MRE/T group skipped the lunch meal far more times than the T/LLRP/T group, which skipped all the meals equally.

Table 23. Number of Skipped Meals

	Breakfast	Lunch	Dinner	Total
T/MRE/T	5	40	7	52
T/LLRP/T	17	17	23	57

Test versus Usual Nutrient Intake

The nutritional intake of the subjects during the test period was compared with their usual nutrient intake (Tables 24 and 25) to determine if the poor intake was a reflection of typical intake. Overall, the subjects' intake during the test was lower than their reported usual intake.

Table 24. Comparison of Test and Usual Nutrient Intake for the T/MRE/T Subjects[1,2]

		T/MRE/T Group		
		Test[2]	Usual[3]	Δ[4]
		n = 46	n = 46	
Energy	kcal	3159 ± 116	3671 ± 209	-512 ± 226
Protein	g	129 ± 4	151 ± 10	-22 ± 10
Carbohydrate	g	363 ± 15	391 ± 23	-28 ± 27
Fat	g	134 ± 5	168 ± 11	-34 ± 11
Iron	mg	18 ± 0.5	23 ± 1	-5 ± 1
Calcium	mg	1385 ± 49	1627 ± 147	-242 ± 150

[1]Mean ± SEM.
[2]Includes only those subjects that completed the diet history questionnaire. Mean intake for 10-day test period.
[3]Per NCI software diet analysis; does not include alcohol consumption.
[4]Δ = (test intake - usual intake).

Table 25. Comparison of Test and Usual Nutrient Intake for the T/LLRP/T Subjects[1,2]

		T/LLRP/T Group		
		Test[2]	Usual[3]	Δ[4]
		n = 35	n = 35	
Energy	kcal	2919 ± 115	3719 ± 268	-800 ± 268
Protein	g	107 ± 4	148 ± 11	-42 ± 12
Carbohydrate	g	363 ± 16	395 ± 34	-32 ± 33
Fat	g	117 ± 5	173 ± 13	-56 ± 13
Iron	mg	16 ± 0.6	24 ± 1	-7 ± 1.6
Calcium	mg	1106 ± 54	1369 ± 127	-263 ± 130

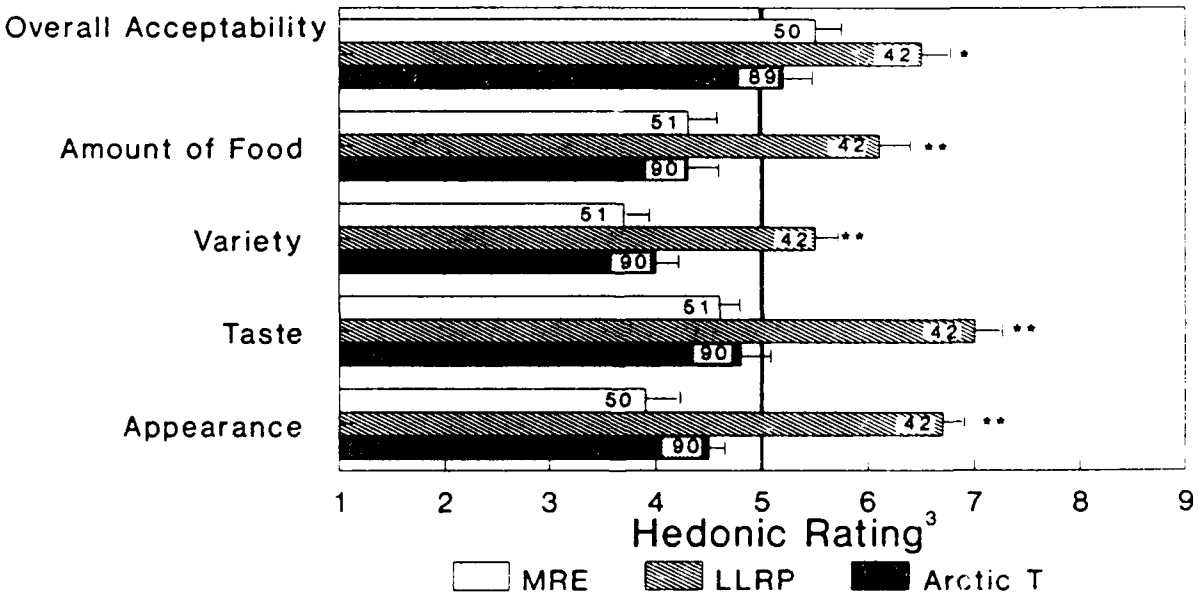
[1]Mean ± SEM.
[2]Includes only those subjects that completed the diet history questionnaire. Mean intake for 10-day test period.
[3]Per NCI software diet analysis; does not include alcohol consumption.
[4]Δ = (test intake - usual intake).

The differences of the test and usual intake between the T/MRE/T and the T/LLRP/T groups (Tables 24 and 25) were similar for all the nutrients analyzed.

RATION ACCEPTABILITY

Figure 7 contains summary ratings of overall acceptability, amount of food, variety, taste and appearance of Meal, Ready-to-Eat (MRE), Long Life Ration Packet (LLRP) and Arctic T Ration. These results show that, on a 9-point scale where 9=extremely satisfied (acceptable), 5=neutral and 1=extremely dissatisfied (unacceptable), the LLRP was rated significantly ($p \leq 0.05$) higher than the MRE for all aspects. The ratings for the MRE and the LLRP ranged from 7.0 corresponding to "somewhat satisfied" to 3.4 corresponding to "moderately dissatisfied". Comparisons between the groups for the Arctic T were similar except that the T/LLRP/T group was significantly ($p \leq 0.05$ and 0.01) more satisfied with the variety than the T/MRE/T group was.

Figure 7. Arctic T,[1] MRE and LLRP Comparison[2]



[1] Combined Artic T Rating (T/MRE/T and T/LLRP/T groups).
[2] Mean rating from number of suojects consuming ration, and SEM (—)
[3] Nine-point hedonic scale (9-extremely satisfied, 5-neutral, 1-extremely dissatisfied)
* p ≤ 0.05
** p ≤ 0.01

When asked to rate how hungry they were during the exercise, both groups reported that they were hungry "fairly often", with ratings of 4.3 ± 0.14 (Mean ± SEM) for the T/MRE/T group and 3.9 ± 0.15 (Mean ± SEM) for the T/LLRP/T group, on a 6-point scale. Although there was no significant difference between the groups, in the T/MRE/T group only 2 percent felt that they always ate enough during the exercise, while in the T/LLRP/T group 9.5 percent felt that they always ate enough. Frequent reasons given for not eating enough are presented in Table 26.

Table 26. Reasons Given for Not Eating Enough[1]

Reason for not eating	T/MRE/T	T/LLRP/T
	%	%
Disliked the food	56.9	52.4
Not enough food provided	52.9	33.3
Not enough time to prepare food	11.8	19.1
Too much trouble to prepare food	15.7	7.1
Not enough time to eat	27.5	31.0
Too cold to eat	31.4	31.0
No heat source to heat the food	9.8	11.9
Poor heat source to heat the food	9.8	7.1
Not enough water to prepare the food	7.8	14.3
Got bored with the food - not enough variety	39.2	40.5
Food was frozen	45.1	23.8
Tried to avoid having to go to the bathroom	7.8	11.9
Did not feel hungry	5.9	23.8
Other[2]	7.8	9.5
Always ate enough during this exercise	2.0	9.5

[1]Soldiers checked all reasons which applied.
[2]T/MRE/T: Too much of one item, not enough of others; Was not awake; Milk almost always frozen; Too tired to eat.
T/LLRP/T: Tired of eating the same T Rations every morning; Tasted terrible; Losing weight.

Meal, Ready-to-Eat

Ratings for individual food items for the Meal, Ready-to-Eat (MRE) are presented in Table 27. Overall, the MRE received ratings of "neutral" or better. Chicken ala King was the lowest rated item with a rating of 5.0, in fact, 25.5 percent thought that it should be dropped from the MRE. The Chocolate Covered Brownie and Potato au Gratin also received low ratings. Applesauce received the highest rating (rating of 7.7) of any item in the ration. Charms also received high ratings.

Table 27. Acceptability Ratings for the Meal, Ready-to-Eat Individual Food Items[1,2]

Food Item	n	Mean ± SEM
Entrees	**50**	**6.3 ± 0.17**
Ham Slice	27	7.3 ± 0.25[a]
Spaghetti, Meat and Sauce	21	6.7 ± 0.37[ac]
Beef Stew	19	6.7 ± 0.30[ad]
Tuna with Noodles	17	6.7 ± 0.26[ad]
Corned Beef Hash	21	6.5 ± 0.29[ad]
Omelet with Ham	14	6.1 ± 0.50[bcd]
Chicken and Rice	17	6.0 ± 0.36[bcd]
Escalloped Potatoes with Ham	19	5.9 ± 0.42[bcd]
Pork, Rice with BBQ Sauce	16	5.9 ± 0.33[bcd]
Meatballs, Rice and Sauce	18	5.8 ± 0.44[bcd]
Chicken Stew	16	5.7 ± 0.46[ce]
Chicken ala King	11	5.0 ± 0.67[be]
Starches	**49**	**6.1 ± 0.17**
Crackers	49	6.2 ± 0.17
Potato au Gratin	13	5.4 ± 0.44
Spreads	**49**	**6.6 ± 0.18**
Cheese Spread	37	6.8 ± 0.25
Peanut Butter	29	6.7 ± 0.34
Jelly	28	6.4 ± 0.30
Fruit	**35**	**7.0 ± 0.24**
Applesauce	24	7.7 ± 0.23[a]
Strawberries	5	7.4 ± 0.51[ab]
Peaches	13	7.2 ± 0.34[ac]
Fruit Mix	8	6.0 ± 0.34[b]
Pears	6	5.9 ± 1.00[bc]
Dessert	**45**	**6.4 ± 0.25**
Chocolate Covered Cookie	22	6.9 ± 0.35[a]
Chocolate Nut Cake	17	6.7 ± 0.65[ab]
Oatmeal Cookie Bar	21	6.2 ± 0.52[ab]
Cherry Nut Cake	18	6.3 ± 0.55[ab]
Maple Nut Cake	22	6.0 ± 0.51[ab]
Chocolate Covered Brownie	21	5.1 ± 0.50[b]
Cold Drink	**33**	**7.5 ± 0.19**
Beverage Base Powder	33	7.5 ± 0.19
Hot Drink	**34**	**7.0 ± 0.22**
Cocoa	27	7.2 ± 0.25
Coffee	18	6.7 ± 0.34
Creamer/Sugar	**17**	**7.1 ± 0.29**
Sugar	16	7.3 ± 0.30
Non Dairy Creamer	9	6.6 ± 0.42
Candy	**49**	**7.3 ± 0.16**
Charms	7	7.6 ± 0.39[a]
Gum	30	7.3 ± 0.28[a]
M&M's	49	7.2 ± 0.19[a]
Caramels	14	7.2 ± 0.36[a]
Seasoning	**20**	**7.2 ± 0.32**
Tabasco Sauce	14	7.5 ± 0.36
Salt	11	6.5 ± 0.44

[1]Nine-point hedonic scale (9=like extremely, 5=neither like nor dislike, 1=dislike extremely). [2]Food items with different superscripts (a,b,c,d,e) are significantly different ($p \leq 0.05$) from other foods within that food category. Foods without a superscript were not compared to any other. n = number of different subjects consuming the food item.

Long Life Ration Packet

Ratings for individual food items in the Long Life Ration Packet (LLRP) are presented in Table 28. Overall, the LLRP received ratings of "like slightly" or higher. The Cornflake Bar and Chocolate Covered Brownie were the lowest rated items (rating of 6.4) in the ration. Nineteen percent thought the Cornflake Bar should be dropped from the ration. The Cornflake/Rice Bar also received low ratings. Turkey Tetrazzini and Tootsie Roll received the highest rating of 8.1, in the ration. Charms, Lemon Tea, Beverage Base Powder and the Fig Bar were also rated highly.

Table 28. Acceptability Ratings for the Long Life Ration Packet Individual Food Items[1,2]

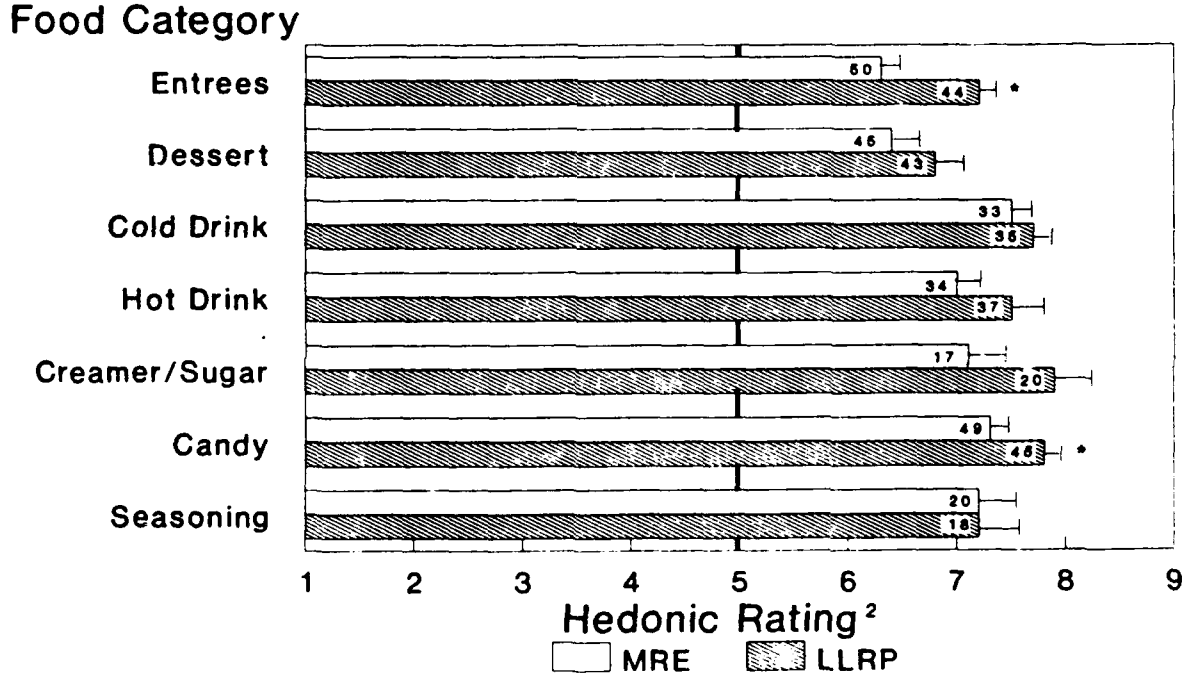
Food Items	n	Mean ± SEM
Entrees	**44**	**7.2 ± 0.15**
Turkey Tetrazzini	8	8.1 ± 0.13[a]
Chicken and Rice	30	7.5 ± 0.25[ab]
Chicken Stew	18	7.3 ± 0.38[ab]
Lasagna	18	7.3 ± 0.24[ab]
Chicken Noodle	16	7.2 ± 0.33[ab]
Chicken ala King	19	7.1 ± 0.40[ab]
Beef Stroganoff	15	7.0 ± 0.49[ab]
Spaghetti with Meat Sauce	30	6.8 ± 0.33[b]
Beef Stew	19	6.8 ± 0.43[b]
Chili con Carne	27	6.8 ± 0.28[b]
Dessert	**43**	**6.8 ± 0.23**
Fig Bar	33	8.0 ± 0.22[a]
Chocolate Covered Cookie	23	7.1 ± 0.21[b]
Granola Bar	32	6.8 ± 0.22[b]
Oatmeal Cookie Bar	18	6.7 ± 0.32[b]
Cornflake/Rice Bar	15	6.5 ± 0.45[b]
Chocolate Covered Brownie	20	6.4 ± 0.48[b]
Cornflake Bar	19	6.4 ± 0.40[b]
Cold Drink	**35**	**7.7 ± 0.18**
Beverage Base Powder	26	7.9 ± 0.19
Orange Beverage	26	7.7 ± 0.26
Hot Drink	**37**	**7.5 ± 0.23**
Lemon Tea	20	7.9 ± 0.24
Apple Cider Drink Mix	21	7.5 ± 0.37
Coffee	19	7.4 ± 0.31
Cocoa	7	6.9 ± 1.10
Creamer/Sugar	**20**	**7.9 ± 0.29**
Sugar	20	7.9 ± 0.28
Non Dairy Creamer	9	7.6 ± 0.43
Candy	**45**	**7.8 ± 0.16**
Tootsie Roll	36	8.1 ± 0.19[a]
Charms	29	7.9 ± 0.19[a]
Starch Jellies	29	7.8 ± 0.25[a]
M&M's	41	7.8 ± 0.18[a]
Chocolate Bar with Toffee	14	7.8 ± 0.36[a]
Gum	26	7.8 ± 0.21[a]
Caramels	19	7.8 ± 0.28[a]
Seasoning	**18**	**7.2 ± 0.39**
Salt	18	7.2 ± 0.39

[1]Nine-point hedonic scale (9=like extremely, 5=neither like nor dislike, 1=dislike extremely).
[2]Food items with different superscripts (a,b) are significantly different ($p \leq 0.05$) from other foods within that food category. Foods without a superscript were not compared to any other.
n = number of different subjects consuming the food item.

Meal, Ready-to-Eat versus Long Life Ration Packet

For comparison, the contents of the MRE and the LLRP were divided into seven food categories of Entrees, Desserts, Cold Drinks, Hot Drinks, Creamer/Sugar, Candy and Seasonings. The food items in each food category are the ones shown in Tables 27 and 28. The mean acceptability ratings and t-test results for the food categories from the MRE and the LLRP rations are presented in Figure 8. The mean ± SEM for each food category can also be found in Tables 27 and 28. In general, the T/LLRP/T group rated their LLRP Entrees and Candy significantly ($p \leq 0.05$) higher than the T/MRE/T group did their MRE items. The other food categories received similar ratings from both groups.

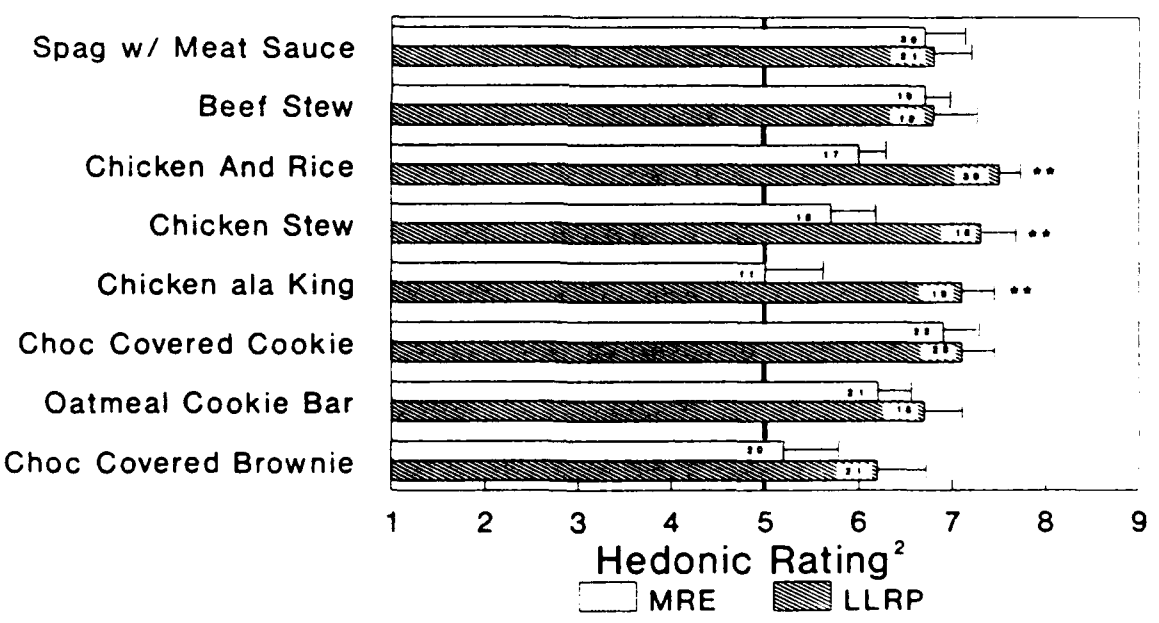
Figure 8. MRE versus LLRP Food Categories[1]



[1] Mean ratings from number of different subjects consuming the ration, and SEM (—).
[2] Nine-point hedonic scale (9=like extremely, 5=neutral, 1=dislike extremely).
* $p \leq 0.05$
** $p \leq 0.01$

A comparison of common food items between the two rations was made to test the effect of group membership on ratings for items either sharing a common name or identical in the MRE and the LLRP. Results are summarized in Figure 9. Five entree items shared the same name but were different in that the MRE items were wet-pack and the LLRP items were dehydrated. Chicken Stew, Chicken ala King, and Chicken and Rice were all rated significantly ($p \leq 0.01$) higher by the T/LLRP/T group, while the Beef Stew and Spaghetti with Meat Sauce were not rated significantly differently. Of the items that were identical in the two rations (Beverage Base Powder, Cocoa, Coffee, Creamer, Charms, Sugar, Caramel, Gum, M&M's and Salt) only the M&M's were rated significantly ($p \leq 0.01$) higher by the T/LLRP/T group.

Figure 9. MRE versus LLRP Similar Food Items[1]



[1] Mean ratings from number of diferent subjects consuming the ration, and SEM (—)
[2] Nine-point hedonic scale (9-like extremely, 5-neutral, 1-dislike extremely)
** p ≤ 0.01

Several of the soldiers commented on the final questionnaire, that they liked the LLRP and that it was great when they had plenty of water, heat, and time to prepare it. They

expressed concern that if they were on the move all the time, as an infantry unit would be, they would not be able to prepare it and eat enough. They would prefer to have the MRE if they were in a tactical situation or on the offense.

Arctic T Ration

Breakfast. Mean ratings for individual food items in the Arctic T Breakfast are presented in Table 29. Overall, the ratings ranged from 7.6 for Cold Cereal to 3.6 for Creamed Ground Beef. Most of the entrees and the Blueberry Cake received ratings below 5.0 (neutral), while all the other items received ratings of "neutral" or better.

Table 29. Acceptability Ratings for the Arctic T Ration Breakfast Individual Food Items[1]

Food Item	Combined Rating[2]		T/MRE/T		T/LLRP/T[3]	
	n	Mean ± SEM	n	Mean ± SEM	n	Mean ± SEM
Entrees	**95**	**4.8 ± 0.15**	**51**	**4.8 ± 0.20**	**44**	**4.8 ± 0.22**
Omelet with Bacon Pieces	**78**	**5.3 ± 0.20^{ab}**	45	5.3 ± 0.28	33	5.3 ± 0.29
Pork Sausage	**94**	**5.7 ± 0.17^{a}**	50	5.3 ± 0.22	44	6.3 ± 0.25**
Eggs and Ham	**90**	**4.7 ± 0.18^{bc}**	50	4.8 ± 0.23	40	4.7 ± 0.30
Western Omelet	**80**	**4.4 ± 0.23^{c}**	43	4.7 ± 0.26	33	4.1 ± 0.40
Potatoes with Bacon Pieces	**68**	**4.5 ± 0.30^{c}**	40	4.7 ± 0.43	28	4.2 ± 0.41
Omelet with Sausage and Potatoes	**83**	**4.7 ± 0.21^{c}**	45	4.3 ± 0.30	38	5.0 ± 0.30
Creamed Ground Beef	**84**	**3.6 ± 0.26^{d}**	48	4.0 ± 0.36	36	3.0 ± 0.36*
Hot Cereal	**34**	**6.7 ± 0.31**	**17**	**6.9 ± 0.35**	**17**	**6.4 ± 0.52**
Apple Cinnamon Oatmeal	**17**	**7.4 ± 0.34^{a}**	7	7.7 ± 0.52	10	7.2 ± 0.47
Strawberry Oatmeal	**27**	**6.2 ± 0.38^{b}**	14	6.4 ± 0.42	13	6.0 ± 0.67
Cold Cereal						
Cold Cereal	**89**	**7.6 ± 0.12**	43	7.8 ± 0.18	43	7.5 ± 0.16
Cake						
Blueberry Cake	**88**	**4.8 ± 0.22**	50	4.8 ± 0.30	38	4.8 ± 0.34
Fruit	**83**	**7.0 ± 0.18**	**47**	**6.7 ± 0.24**	**36**	**7.4 ± 0.27**
Pears	**76**	**7.2 ± 0.20^{a}**	40	7.1 ± 0.29	36	7.4 ± 0.27
Peaches	**36**	**6.2 ± 0.38^{b}**	36	6.2 ± 0.38	-	-
Milk						
Milk	**94**	**6.9 ± 0.15**	51	6.9 ± 0.19	43	6.8 ± 0.24
Hot Drink	**33**	**7.3 ± 0.24**	**15**	**7.8 ± 0.29**	**18**	**7.6 ± 0.36**
Cocoa	**12**	**7.5 ± 0.37**	10	7.2 ± 0.38	2	9.0 ± 0.00
Coffee	**25**	**7.1 ± 0.30**	9	6.6 ± 0.48	16	7.4 ± 0.27

[1] *Nine-point hedonic scale (9=like extremely, 5=neither like nor dislike, 1=dislike extremely).*

[2] Food items with different superscripts within a column (a,b,c,d) are significantly different ($p \leq 0.05$) from other foods within that food category. Foods without a superscript were not compared to any other.

[3] Food items with asterisks (* or **) differ significantly ($p \leq 0.05$ and 0.01, respectively) from the T/MRE/T (control) group. A dash (-) indicates no between group comparisons were made because of insufficient data or too much variability.

n = number of different subjects consuming the food item.

In the T/MRE/T group, Omelet with Bacon Pieces, and Pork Sausage received a mean rating of 5.3, the highest among the entrees. The lowest rating was given to Creamed Ground Beef with a mean rating of 4.0. The Hot and Cold Cereals received ratings of 6.4 or better. Blueberry Cake received a mean rating of 4.8. Fruit and Beverages received high ratings. The Chicken Noodle Soup received the highest rating of any item with an 8.3, though only five people consumed it. The next highest item was the Cold Cereal with a rating of 7.7.

In the T/LLRP/T group, Pork Sausage received a mean rating of 6.3, the highest among the entrees. Creamed Ground Beef received the lowest rating of 3.0, which was also the lowest rating for any item by the T/LLRP/T group. The Hot and Cold Cereals received ratings of 6.0 or better. Blueberry Cake received a mean rating of 4.8. Fruit and Beverages received high ratings.

Comparisons between the groups showed that the T/LLRP/T group rated the Pork Sausage higher, while the T/MRE/T group rated the Creamed Ground Beef higher, even though both groups received the same foods. For further comparison, the individual items were divided into eight food categories, as listed in Table 29. There were no significant differences between the T/MRE/T and the T/LLRP/T groups' ratings for these food categories. Figure 10 shows the combined ratings for both groups.

Figure 10. Arctic T Breakfast Ratings[1]

[1]Mean rating from number of different subjects consuming the ration, and SEM ( )
[2]Nine-point hedonic scale (9=like extremly, 5=neutral, 1=dislike extremly)

Dinner. Table 30 presents the mean ratings for individual food items in the Arctic T Dinner. Overall, the combined ratings ranged from 9.0 for Cherry Beverage to 4.9 for Chocolate Cake. Most of the ratings were "neutral" or better.

Table 30. Acceptability Ratings for the Arctic T Ration Dinner Individual Food Items[1]

	Combined Rating[2]		T/MRE/T		T/LLRP/T[3]	
	n	Mean ± SEM	n	Mean ± SEM	n	Mean ± SEM
Entrees	**96**	**6.3 ± 0.14**	**51**	**6.0 ± 0.18**	**45**	**6.6 ± 0.19***
Chicken Breasts with Gravy	**87**	**7.4 ± 0.19^{a}**	47	6.9 ± 0.28	40	8.1 ± 0.19**
Beef Pot Roast with Gravy	**94**	**7.2 ± 0.16^{a}**	50	6.8 ± 0.24	44	7.7 ± 0.16**
Lasagna with Meat Sauce	**89**	**6.5 ± 0.18^{bc}**	48	6.3 ± 0.25	41	6.7 ± 0.28
Hamburgers	**87**	**6.6 ± 0.22^{b}**	46	6.1 ± 0.33	41	7.1 ± 0.26*
Chicken Cacciatore	**81**	**5.9 ± 0.24^{a}**	43	6.0 ± 0.31	38	5.9 ± 0.37
Barbecue Pork	**80**	**5.2 ± 0.27^{cd}**	45	5.1 ± 0.34	35	5.4 ± 0.43
Chili	**90**	**5.5 ± 0.22^{de}**	49	5.1 ± 0.28	41	6.0 ± 0.32*
Starch	**95**	**6.3 ± 0.16**	**51**	**5.9 ± 0.22**	**44**	**6.7 ± 0.20****
Rice	**95**	**6.4 ± 0.18^{a}**	51	6.0 ± 0.25	44	6.9 ± 0.24*
Macaroni and Cheese	**75**	**5.8 ± 0.26^{a}**	45	5.8 ± 0.32	30	5.9 ± 0.44
Noodles in Butter Sauce	**25**	**6.4 ± 0.41^{a}**	12	5.7 ± 0.54	13	7.1 ± 0.56
Glazed Sweet Potatoes	**70**	**6.4 ± 0.26^{a}**	37	5.6 ± 0.36	33	7.2 ± 1.70**
Vegetables	**96**	**5.9 ± 0.15**	**51**	**5.5 ± 0.19**	**45**	**6.4 ± 0.23****
Corn	**94**	**6.7 ± 0.17^{a}**	49	6.3 ± 0.25	45	7.0 ± 0.21*
Sliced Carrots	**66**	**5.9 ± 0.26^{b}**	36	5.9 ± 0.34	30	5.8 ± 0.40
Beans with Bacon Sauce	**76**	**5.8 ± 0.27^{b}**	42	5.3 ± 0.39	34	6.4 ± 0.32*
Green Beans	**74**	**5.7 ± 0.23^{b}**	39	5.2 ± 0.32	35	6.1 ± 0.30*
Peas with Carrots	**59**	**5.3 ± 0.30^{b}**	37	5.1 ± 0.38	22	5.6 ± 0.49
Fruit	**93**	**7.5 ± 0.14**	**49**	**7.4 ± 0.21**	**44**	**7.7 ± 0.18**
Peaches	**53**	**7.8 ± 0.20^{a}**	21	7.8 ± 0.34	32	7.8 ± 0.25
Fruit Cocktail	**87**	**7.7 ± 0.16^{a}**	46	7.5 ± 0.25	41	7.9 ± 0.20
Applesauce	**66**	**7.1 ± 0.23^{b}**	38	7.1 ± 0.30	28	7.0 ± 0.36
Dessert	**95**	**5.3 ± 0.17**	**51**	**4.9 ± 0.22**	**44**	**5.8 ± 0.25****
Pound Cake	**73**	**5.9 ± 0.28^{a}**	40	5.4 ± 0.41	33	6.4 ± 0.35
Spice Cake	**67**	**5.7 ± 0.26^{ad}**	39	5.3 ± 0.36	28	6.2 ± 0.34
Chocolate Pudding	**53**	**5.4 ± 0.33^{abc}**	35	5.3 ± 0.38	18	5.5 ± 0.64
Marble Cake	**76**	**5.0 ± 0.27^{bcd}**	43	4.3 ± 0.35	33	5.9 ± 0.39**
Chocolate Cake	**78**	**4.9 ± 0.26^{e}**	41	4.3 ± 0.36	37	5.5 ± 0.35*
Blueberry Cake	**23**	**6.0 ± 0.53^{a}**	-	-	23	6.0 ± 0.53
Spreads	**22**	**6.6 ± 0.47**	**3**	**7.7 ± 0.88**	**19**	**6.5 ± 0.53**
Cheese Spread	**13**	**5.9 ± 0.79**	2	8.5 ± 0.50	11	5.4 ± 0.86
Jelly	**11**	**7.2 ± 0.41**	1	6.0 ± 0.00	10	7.3 ± 0.45
Peanut Butter	**10**	**7.2 ± 0.45**	1	6.0 ± 0.00	9	7.3 ± 0.48
Cold Beverage	**23**	**7.4 ± 0.34**	**6**	**6.2 ± 0.87**	**17**	**7.9 ± 0.30**
Cherry Beverage	**2**	**9.0 ± 0.00^{a}**	1	9.0 ± 0.00	1	9.0 ± 0.00
Orange Beverage	**18**	**7.2 ± 0.43^{ab}**	4	5.8 ± 1.30	14	7.6 ± 0.82
Grape Beverage	**12**	**7.4 ± 0.50^{ab}**	3	5.7 ± 1.50	9	8.0 ± 0.33*
Lemon Beverage	**3**	**5.0 ± 2.00^{b}**	1	3.0 ± 0.00	2	6.0 ± 3.00
Lemon-Lime Beverage	**6**	**7.4 ± 0.66^{ab}**	-	-	6	7.4 ± 0.66
Milk						
Milk	**92**	**7.0 ± 0.14**	51	6.9 ± 0.18	41	7.2 ± 0.23
Hot Drink	**27**	**7.4 ± 0.25**	**11**	**6.8 ± 0.41**	**16**	**7.9 ± 0.28***
Cocoa	**7**	**7.1 ± 0.63**	5	6.8 ± 0.80	2	8.0 ± 1.00
Coffee	**23**	**7.3 ± 0.31**	8	6.3 ± 0.33	15	7.9 ± 0.29**

[1]Nine-point hedonic scale (9=like extremely, 5=neither like nor dislike, 1=dislike extremely).

[2]Food items with different superscripts within a column (a,b,c,d,e) are significantly different ($p \leq 0.05$) from other foods within that food category. Food without a superscript were not compared to any other.

[3]Food items with asterisks (* or **) differ significantly ($p \leq 0.05$ and 0.01, respectively) from the T/MRE/T (control) group. A dash (-) indicates that no between group comparisons were made because of insufficient data or too much variability.

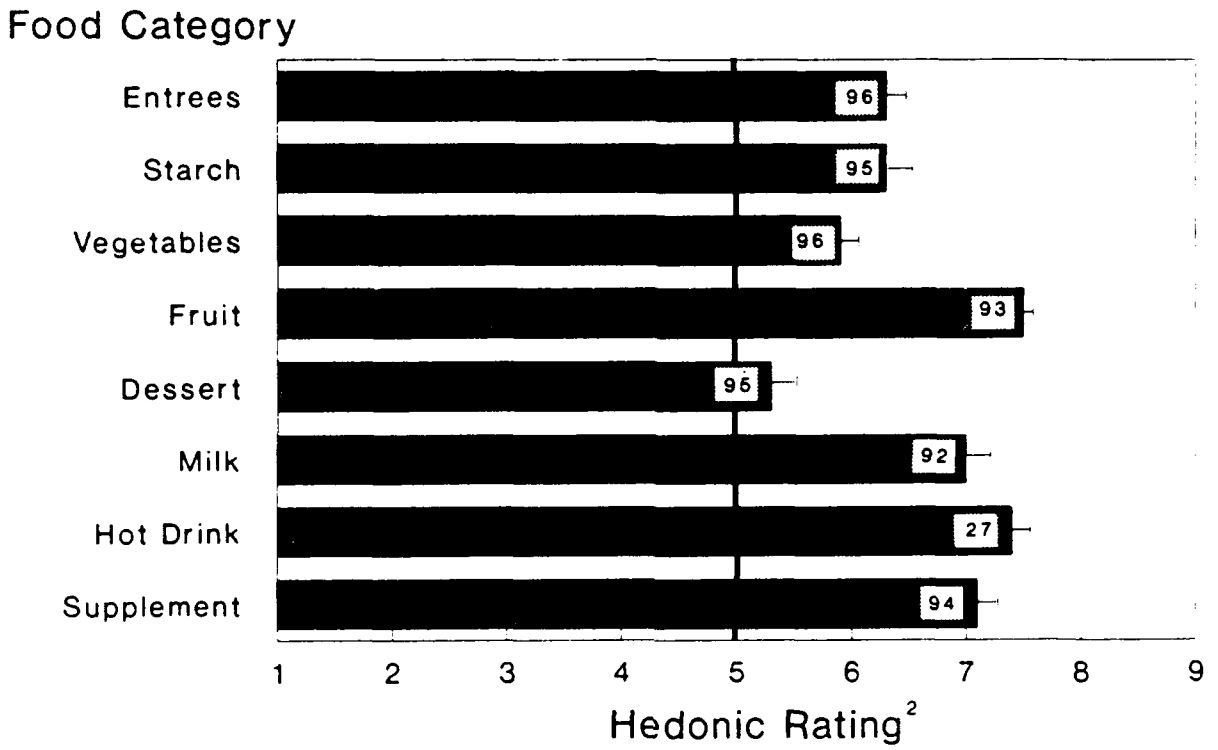
n = number of different subjects consuming the food item.

In the T/MRE/T group, the Chicken Breasts with Gravy received the highest mean rating of 6.9, while Chili and Barbecue Pork received the lowest mean rating of 5.1. Of the starches, Rice received the highest rating of 6.0, while Glazed Sweet Potatoes received the lowest rating of 5.6. Corn was rated the highest of the vegetables (rating of 6.3), while Peas with Carrots was rated the lowest (rating of 5.1). Of the fruit, Peaches were rated at 7.8, which was the highest rated item in the ration, while Applesauce received the lowest fruit rating at 7.1. Desserts ranged from a high of 5.4 for Pound Cake to 4.3 for Chocolate Cake and Marble Cake, which were the lowest rated items in the ration. Spreads and drinks, with the exception of Lemon Beverage at 3.0, received high ratings. A low number of soldiers drank the cold beverages so those ratings are not representative.

In the T/LLRP/T group, Chicken Breasts with Gravy was the highest rated entree with a mean rating of 8.1, while Barbecue Pork was the lowest with a mean of 5.4. Of the starches, Glazed Sweet Potatoes were rated the highest with a mean of 7.2, while Macaroni and Cheese was the lowest with a rating of 5.9. In the vegetable group, Corn received the highest rating at 7.0 and Peas with Carrots was the lowest at 5.6. Of the fruit, Fruit Cocktail at 7.9 received the highest rating, while Applesauce received the lowest at 7.0. Desserts ranged from a high of 6.4 for Pound Cake to a low of 5.5 for Chocolate Pudding and Chocolate Cake. Items in the spreads and drinks both received high ratings.

The T/LLRP/T group rated Chicken Breasts with Gravy, Beef Pot Roast with Gravy, Hamburgers, Chili, Rice, Glazed Sweet Potatoes, Corn, Green Beans, Beans with Bacon Sauce, Marble Cake, Chocolate Cake, Grape Beverage, and Coffee significantly higher than the T/MRE/T group did. For further comparison, the dinner food items were divided into nine food categories. The food items contained in each category are shown in Table 30. The T/LLRP/T group rated the Entrees, Starch, Vegetables, Dessert and Hot Drinks significantly ($p \leq 0.05$) higher than the T/MRE/T group did. In contrast to the Arctic T Breakfast, the T/LLRP/T group rated the Arctic T Dinner substantially higher than the T/MRE/T group did. Figure 11 shows the combined ratings from both groups.

Figure 11. Arctic T Dinner Ratings[1]



[1]Mean ratings from number of different subjects consuming theration, and SEM (—)
[2]Nine-point hedonic scale (9=like extremely, 5=neutral, 1=dislike extremely)

Supplement. The Arctic T Caloric Supplement was provided at both the breakfast and the dinner meals to be consumed anytime during the day. The same four core foods were provided each time. Both groups rated the supplement items high. For the most part, there was not a significant difference between the T/MRE/T and the T/LLRP/T groups, except for M&M's which was rated higher ($p \leq 0.05$) by the T/LLRP/T group than the T/MRE/T group (7.9 and 7.1, respectively) at the breakfast meal. The combined ratings are presented in Table 31. The ratings varied from one meal to the other, but not significantly.

Table 31. Acceptability Ratings for the Arctic T Ration Supplement Individual Food Items[1,2]

Food Item	Combined Rating[3] - Breakfast		Combined Rating[3] - Dinner	
	n	Mean ± SEM	n	Mean ± SEM
Chicken Noodle Soup	10	7.9 ± 0.28	9	6.4 ± 0.64
M&M's	67	7.4 ± 0.20	63	7.4 ± 0.22
Granola Bar	51	7.4 ± 0.19	51	7.6 ± 0.17
Pouched Bread	75	6.3 ± 0.21	91	6.5 ± 0.17

[1]Nine-point hedonic scale (9=like extremely, 5=neither like nor dislike, 1=dislike extremely).
[2]Ratings not significantly different between the breakfast and the dinner meals.
[3]Ratings not significantly different between the T/MRE/T and the T/LLRP/T groups.
n = number of different subjects consuming the food item.

Temperature of Rations

In rating the temperature of different food categories in the rations, the only significant difference was between the temperature of the Entrees in the MRE ration and the LLRP ration. The T/LLRP/T group said their Entree was "hot" while the T/MRE/T group said theirs was "neutral". In the T/LLRP/T group, 76.2 percent reported that they heated water for the Entree everyday. In contrast, only 45.1 percent of the T/MRE/T group reported daily heating of the Entree. Heated beverages were reported as "warm". Arctic T Entrees, Vegetables and Starches were reported as being "neutral" for both groups.

Some problems with the rations freezing were reported. The frequency of frozen rations is presented in Table 32. Damage to the ration's packets was not identified as a problem by either group.

Table 32. Frequency of Frozen Rations[1]

	MRE	LLRP	Arctic T	
			T/MRE/T	T/LLRP/T
	%	%	%	%
More Than Once A Day	27.1	0	6.3	4.9
Daily	43.8	14.6	4.2	4.9
About Every Other Day	8.3	2.4	4.2	14.6
A Few Times	8.3	7.3	25.0	17.1
Once	2.1	4.9	20.8	7.3
Never	10.4	70.7	39.6	51.2

[1]Percentages are from those who answered the question.

Ease of Preparation of Rations

When asked about how easy it was to prepare the ration (MRE or LLRP) for consumption, both groups reported being "somewhat satisfied" on a 9-point scale. However, when asked about how easy the ration was to use, there was a significant ($p \leq 0.05$) difference between the groups. While T/MRE/T group was "neutral" with a rating of 5.4, the T/LLRP/T group thought it was "moderately easy" to use with a rating 6.8.

FLUID INTAKE AND HYDRATION STATUS

Table 33 contains summary ratings for difficulty of obtaining water, how often obtained enough water, and thirst. There were no significant differences between the groups. Both groups found it "slightly easy" to obtain water, "almost always" obtained enough, but reported being thirsty "fairly often".

Table 33. Water Procurement and Thirst[1]

	T/MRE/T	T/LLRP/T
Difficulty of Obtaining Water[2]	3.6 ± 0.13	3.6 ± 0.14
How Often Obtained Enough Water[3]	4.5 ± 0.15	4.7 ± 0.18
Thirst[3]	3.6 ± 0.25	3.8 ± 0.28

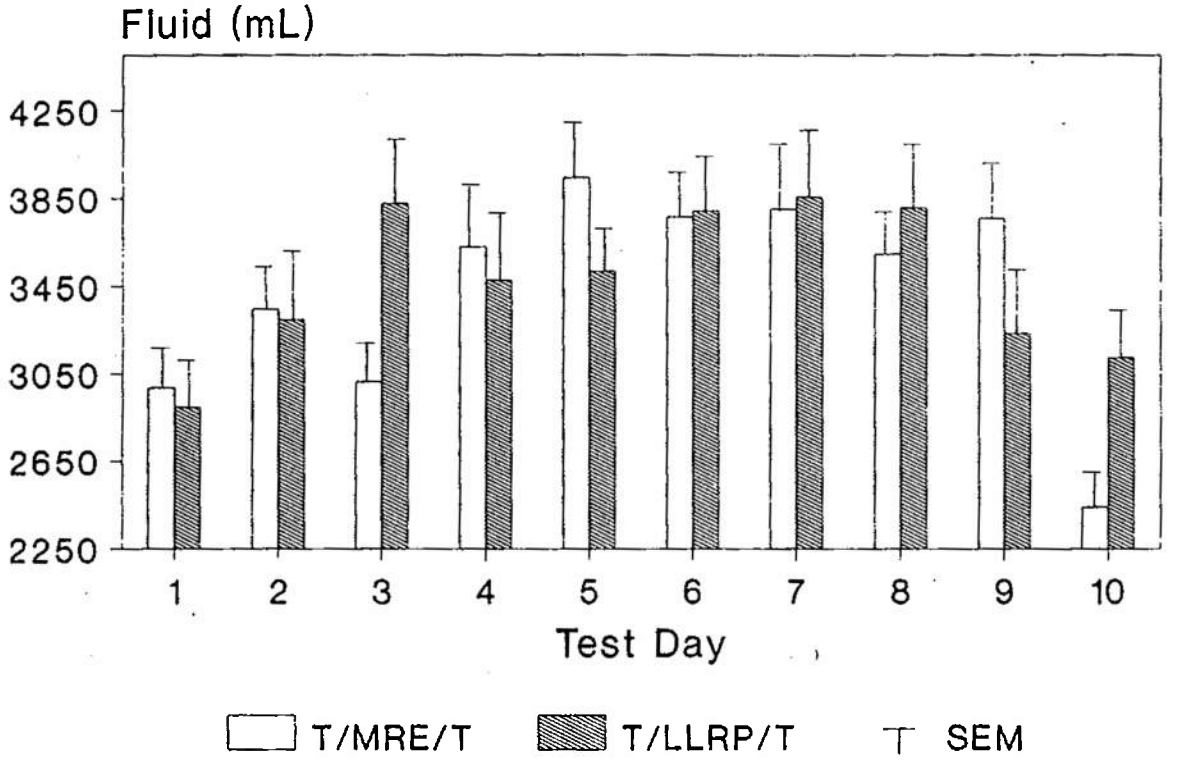
[1]Mean ± SEM
[2]Nine-point scale (9=extremely easy, 5=neutral, 1=extremely difficult).
[3]Six-point scale (6=always, 1=never).

In the T/MRE/T group, 41.2 percent said they drank enough during the exercise, while in the T/LLRP/T group only 31 percent said they drank enough. In the T/MRE/T group, the most frequent reason for not drinking enough was that their water was frozen, with 23.5 percent reporting this. In the T/LLRP/T group, 50 percent reported that their water was frozen and 21.4 percent felt that not enough water was available.

Total fluid intake (includes water from canteen, re-hydration of foods and food items) during the 10-day test period is presented in Figure 12. The only days with an average intake of less than 3L were D+1 for both groups, D+3 for the T/MRE/T group and D+10 (the last day) for the T/MRE/T group. Overall, total fluid intake between groups was not significantly different, although it varied from one day to another. Further, there was not a detectable fluid intake trend or pattern during the test.

The water influx as determined from deuterium correlated ($r = 0.50$; $p = 0.14$) with the calculated water intake which included the water intake self-reported by the subjects using the Diet Log.

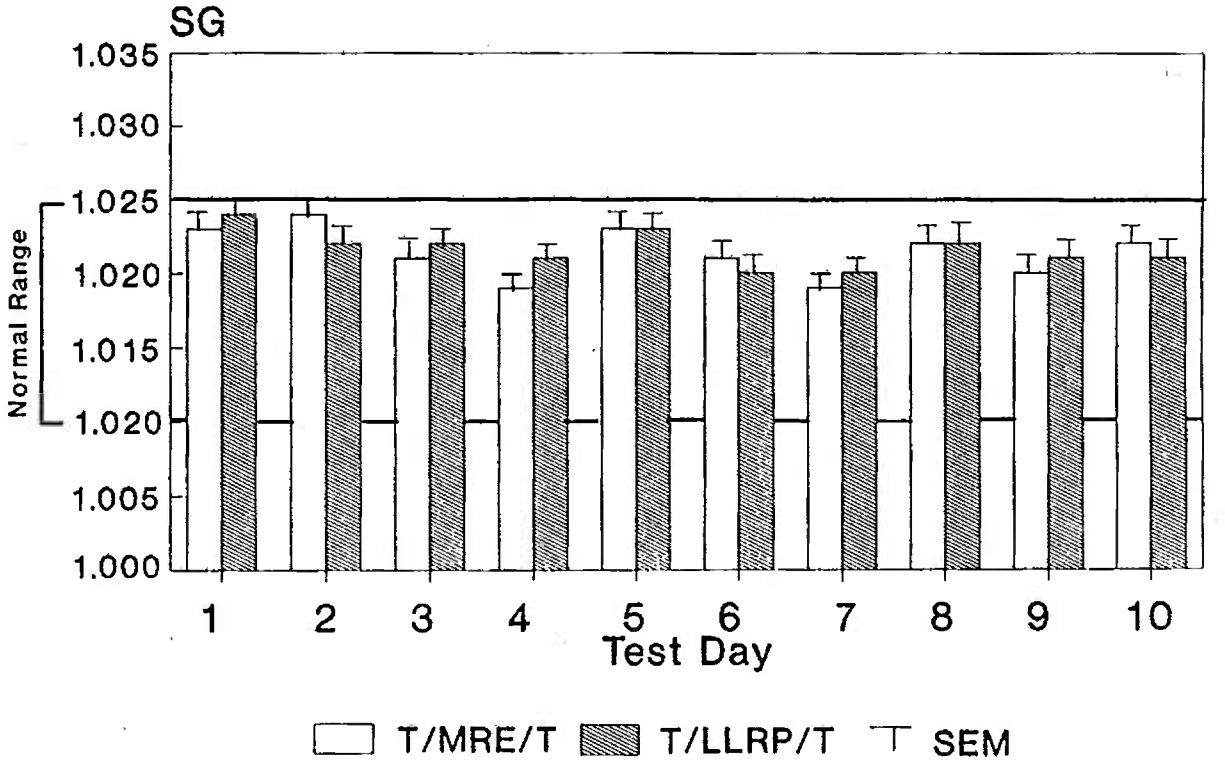
Figure 12. Mean Daily Fluid Intake[1]



[1]Includes water from canteen, re-hydration of foods, and food items.

Since hydration status affects food intake, an effort was made to minimize its effect. Hydration status was assessed on a daily basis by measuring urine specific gravity (SG) (43). These data are presented in Figure 13. Subjects with two consecutive early morning urinary SG greater than 1.030 were instructed to increase their fluid intake. Thus, all mean values were within the normal range (1.020 to 1.025) for a group engaged in a field operation in a cold environment. The SG for both groups was similar and fairly consistent during the test. Further, the pre- and post-test hematocrit levels (45.7 and 46.5 percent, respectively) were within the normal range of 41-47 percent. Although they varied slightly, this was not a significant change.

Figure 13. Mean Daily Urine Specific Gravity



GASTROINTESTINAL ILLNESS

On the final questionnaire, the subjects were asked to rate physical symptoms during the 10-day test period based on how they typically felt. For constipation and heartburn/stomach acid, there was a significantly ($p \leq 0.05$) different distribution of percentages between the two groups. In the T/MRE/T group, a higher percentage reported experiencing more constipation and heartburn/stomach acid, while in the T/LLRP/T group, a higher percentage reported experiencing less constipation and heartburn/stomach acid. Table 34 summarizes these data.

Table 34. Frequency of Physical Symptoms Experienced

	Group	n	Frequency of Symptoms[1,2] Less %	Same %	More %
Cramps/Gas	T/MRE/T	49	8.2	65.3	26.5
	T/LLRP/T	42	14.3	66.7	19.0
Nausea/Vomiting	T/MRE/T	49	28.6	65.3	6.1
	T/LLRP/T	42	35.7	64.3	0
Diarrhea	T/MRE/T	49	27.1	60.4	12.5
	T/LLRP/T	42	31.0	57.1	11.9
Constipation	T/MRE/T	49	10.2	61.2	28.6
	T/LLRP/T	42	38.1*	54.8	7.1*
Acid Stomach	T/MRE/T	49	14.3	59.2	26.5
	T/LLRP/T	42	31.0*	59.5	9.5*
Appetite	T/MRE/T	49	24.5	46.9	28.6
	T/LLRP/T	42	19.0	59.5	21.4

[1]Percentages are from those who answered the question.
[2]Percentages with an asterisk (*) differ significantly ($p \leq 0.05$) from the T/MRE/T (control) group.

During the 10-day test period, there were no sick call visits due to gastrointestinal complaints. There were verbal reports from the medics (MOS 91A) that some subjects (three from the T/MRE/T group, and one from the T/LLRP/T group) casually alluded to minor gastrointestinal dysfunction. These conditions were not of sufficient duration or magnitude to warrant medical attention, and the medics' recommendation to these subjects was to take only fluids until the symptoms were relieved. The compliance of the subjects with these recommendations was not monitored, and consequently, it is unknown to what degree, if any, this advice resulted in a change in eating behavior.

ACTIVITY PATTERNS

Self-reported Activity Level

On the final questionnaire, the subjects were asked to describe their level of activity during the training exercise. The results are summarized in Table 35. Both groups reported experiencing moderate to mixed levels of activity, and there was no significant difference between the groups.

Table 35. Self-reported Activity Level[1]

Daily Physical Activity	T/MRE/T	T/LLRP/T
	%	%
Heavy	7.8	7.1
Moderate	39.2	45.2
Light	11.8	7.1
Mixed, day to day	41.2	40.5

[1]Percentages are from those who answered the question.

Activity Monitors (Actigraph)

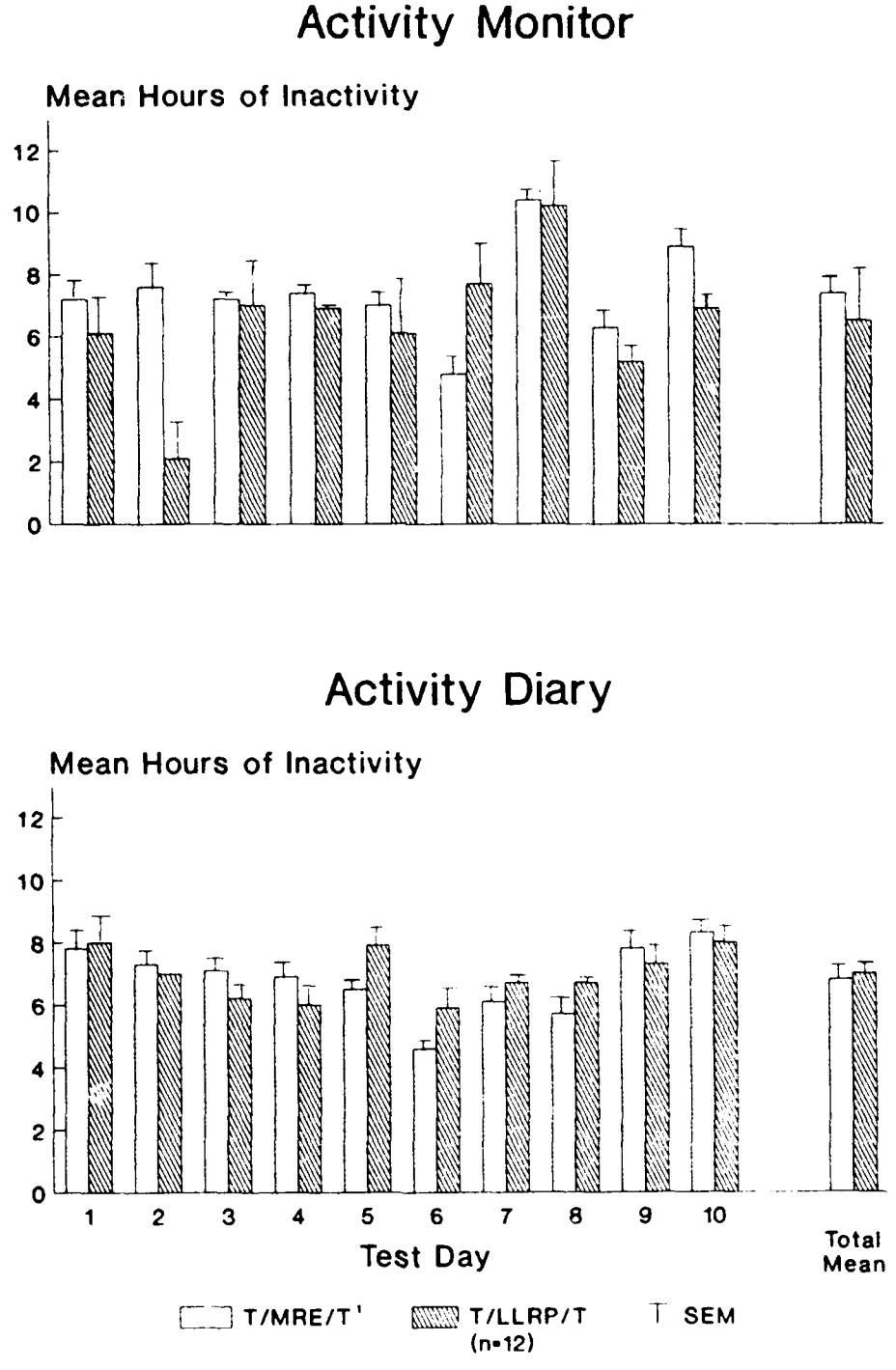
Actigraph data retrieval rates were lower than expected because: 1) battery failure; 2 monitors in the T/MRE/T group and 5 monitors in the T/LLRP/T group, 2) subjects non-compliance; 2 subjects from the T/MRE/T group and 3 subjects from T/LLRP/T group, and 3) subjects attrition; 2 subjects from the T/LLRP/T group. Complete data were collected on only ten T/MRE/T and two T/LLRP/T subjects.

The mean daily number of hours of inactivity during the 9-day recording period for each group is presented in Figure 15. The mean number of hours of inactivity for the T/MRE/T group was 7.4 ± 0.5 (Mean ± SEM) ranging from 4.8 ± 0.4 to 10.4 ± 0.2 hours. The mean number of hours of inactivity for the T/LLRP/T group was 6.5 ± 1.6 (Mean ± SEM) and ranged from 2.1 ± 1.1 to 10.2 ± 1.6 hours. These means were not significantly different between the groups.

Daily Activity Diary

Ninety three percent of the activity diaries given out to the T/MRE/T group and 77 percent of those given to the T/LLRP/T group were retrieved. Consequently, activity diary data were collected from 21 T/MRE/T and 10 T/LLRP/T subjects. The mean number of hours of inactivity during the 10-day activity diary period for each group is also presented in Figure 14. The daily mean number of hours of inactivity (sleep) reported by subjects in the T/MRE/T and T/LLRP/T groups were 6.8 ± 0.3 and 7.0 ± 0.2, respectively. These means were not significantly different.

Figure 14. Activity Patterns



[1]T/MRE/T n=13 and 21 for monitor and diary, respectively.

Actigraph versus Diary

A comparison (n=10) between activity diary and actigraph monitor data revealed a significant correlation ($r = 0.48$; $p = 0.000$) between the amount of sleep that subjects reported receiving and what the actigraph monitors reported them as receiving, suggesting a consistency between the two measures of activity.

NITROGEN BALANCE

One of the subjects participating in the nitrogen balance part of the test was withdrawn due to tonsillitis. Therefore, the data presented are based on the results from 19 subjects (Table 36). Nine of the 19 test subjects were in negative nitrogen balance, averaging -11.46 g/24 h. Overall, nitrogen balance was slightly positive (+0.30 ± 2.02; Mean ± SEM).

Table 36. Nitrogen Balance Data[1,2]

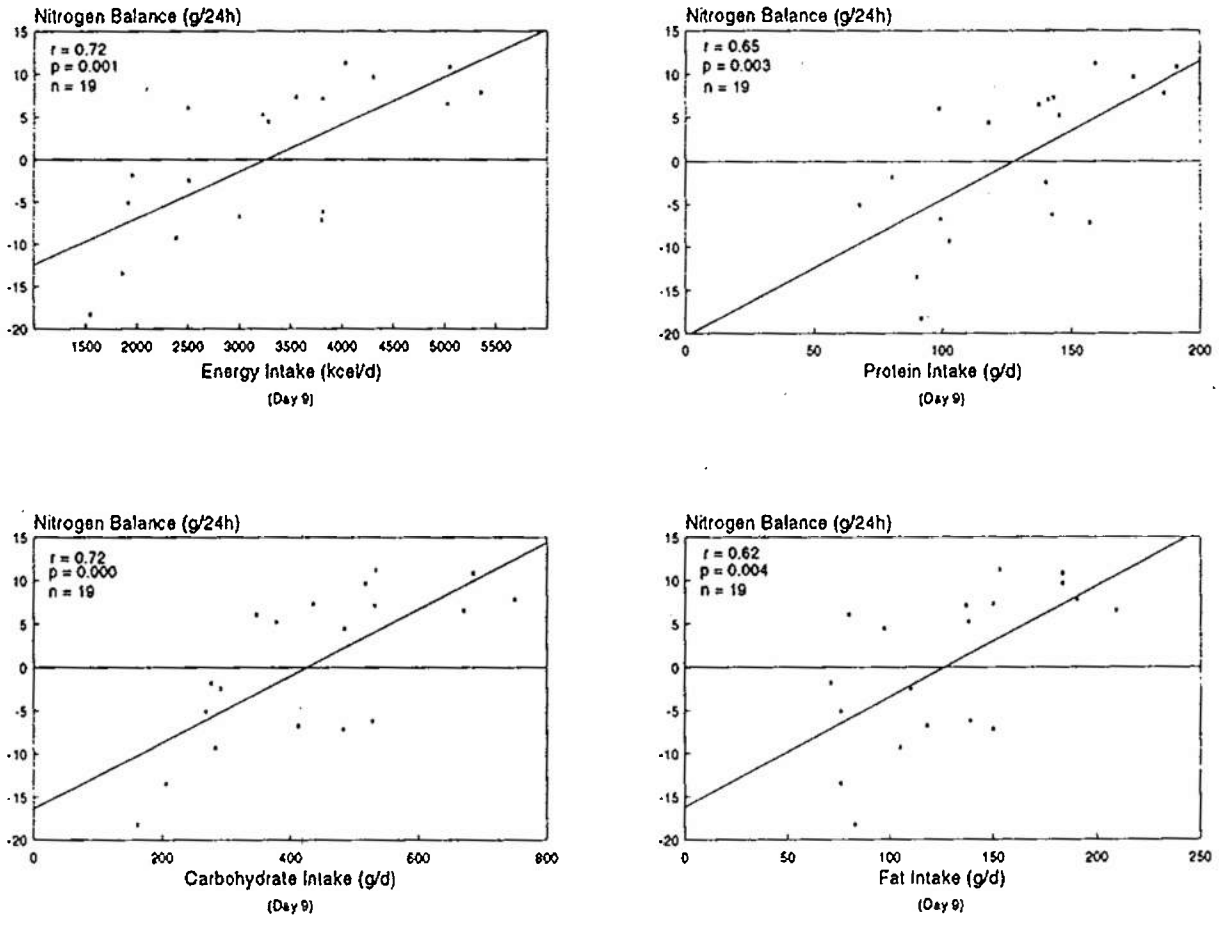
Subjects #	Urine Volume	Urine Creatinine	Nitrogen Intake	Nitrogen Excretion	Nitrogen Balance
	mL/24h	mg/24h	g/24h	g/24h	g/24h
1	2400	2196	15.91	20.63	-6.72
2	1039	1460	22.58	13.47	+7.11
3	3546	4340	25.12	30.28	-7.16
4	1988	2010	12.89	12.72	-1.83
5	1604	1511	22.91	13.59	+7.32
6	2260	3795	14.45	25.91	-13.46
7	1569	3530	16.43	23.72	-9.29
8	3518	5984	14.72	30.98	-18.26
9	2110	1806	18.93	12.50	+4.44
10	3794	3069	22.80	26.98	-6.18
11	2459	2122	22.00	13.46	+6.54
12	1435	1629	10.89	13.98	-5.09
13	2974	2186	29.77	19.99	+7.79
14	2003	2121	30.61	17.81	+10.80
15	1274	1505	15.86	7.81	+6.05
16	3518	2371	23.24	16.01	+5.23
17	1879	1988	27.85	16.20	+9.65
18	2198	1492	25.50	12.25	+11.25
19	1946	3522	22.43	22.89	-2.46
Mean	**2290**	**2560**	**20.78**	**18.50**	**+0.30**
SEM	**189**	**275**	**1.29**	**1.53**	**2.02**

[1]Data for day 9.

[2]Subsample from the T/MRE/T group (n=19).

Nitrogen balance showed a positive correlation between total energy intake (r = 0.72; p = 0.001) and also between the components of total energy intake: protein (r = 0.65; p = 0.003), carbohydrate (r = 0.72; p = 0.000), and fat (r = 0.62; p = 0.004) (Figure 15).

Figure 15. Energy/Macronutrient Intake and Nitrogen Balance



ENERGY EXPENDITURE

The mean energy expenditure for the 10 subjects from the T/MRE/T group that received the doubly labeled water was 4253 ± 151 kcal/d (Mean ± SEM) (Table 37). This mean energy expenditure is 94.5 percent of the current estimated energy requirement (MRDA) for

field operations in a cold environment with a mean temperature of less than 57.2°F (9). Energy expenditure ranged from 3650 to 5104 kilocalories, representing 81 and 113 percent, respectively, of the MRDA.

Table 37. Energy Expenditure Data[1]

Subject #	Energy Expenditure
	kcal/d
1	3650
2	4068
3	5104
4	3893
5	3821
6	3865
7	4593
8	4782
9	4236
10	4514
Mean	**4253**
SEM	**151**

[1]Subsample (n=10) from the T/MRE/T group.

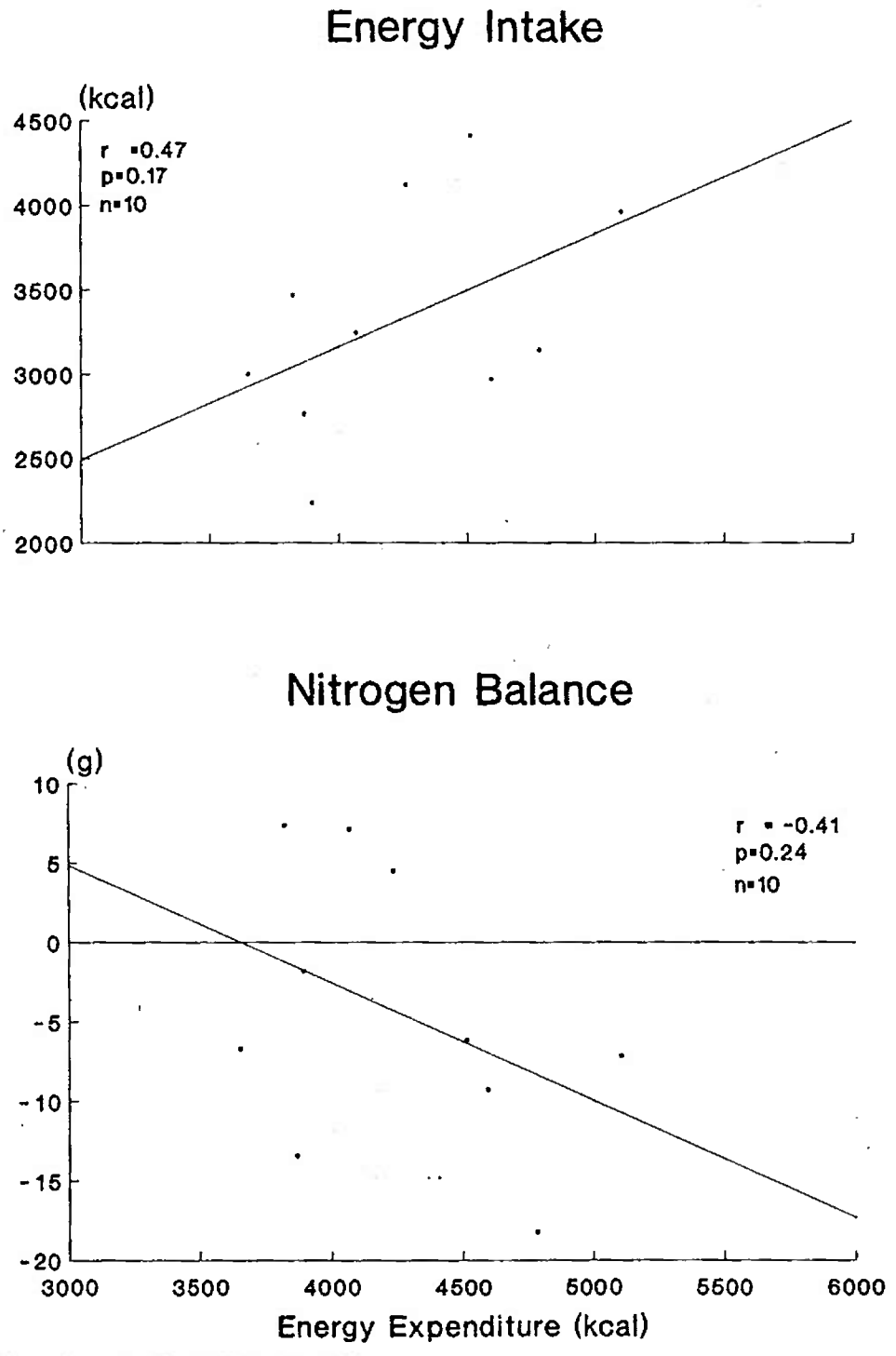
Energy expenditure correlations with energy intake, and with nitrogen balance are displayed in Figure 16. Energy expenditure showed a positive correlation with energy intake ($r = 0.47$; $p = 0.17$), and a negative one with nitrogen balance ($r = -0.41$; $p = 0.24$). Both correlations were modest but not significant.

A correlation analysis was also run between the gross energy deficit:

[(energy intake on day 9) - (10-day mean measured energy expenditure)]

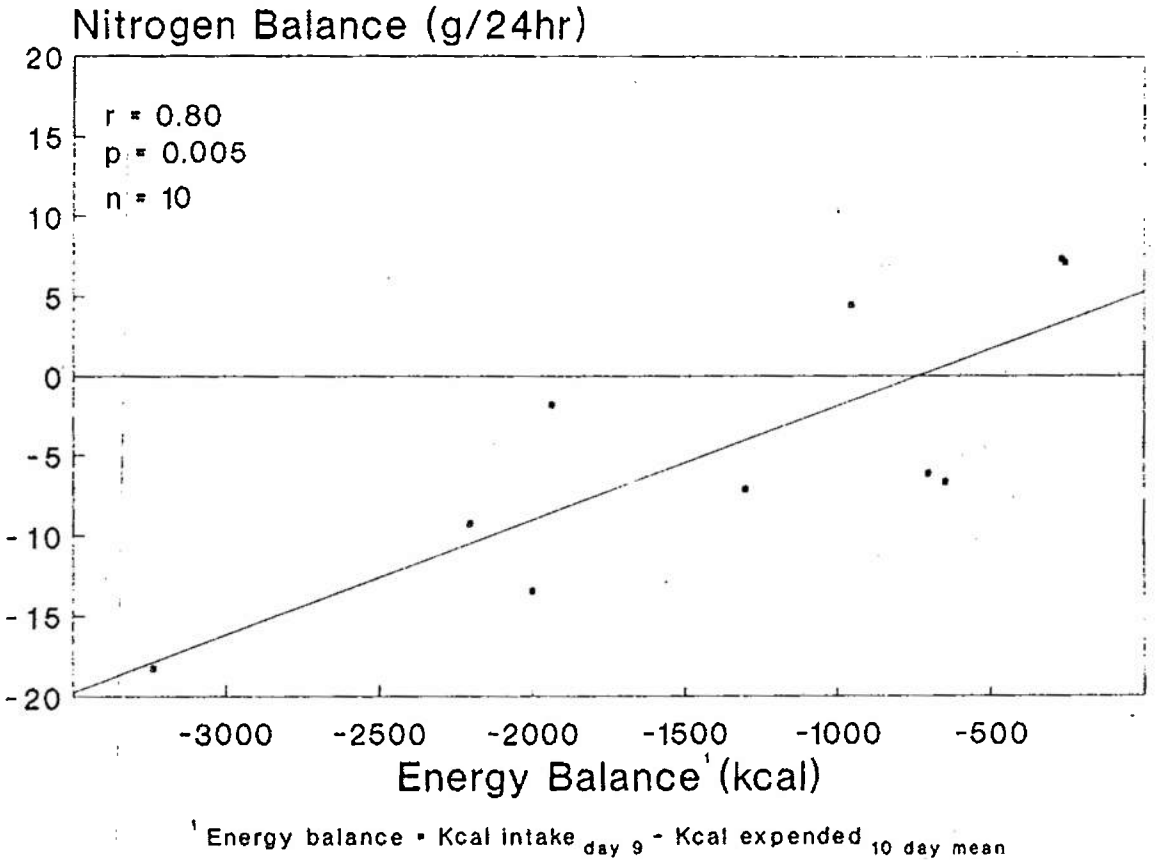
and nitrogen balance for these 10 individuals. The results are shown in Figure 17. Energy deficit and nitrogen balance had a highly significant ($p = 0.005$), strong ($r = 0.80$) correlation.

Figure 16. Energy Expenditure [1] Correlations



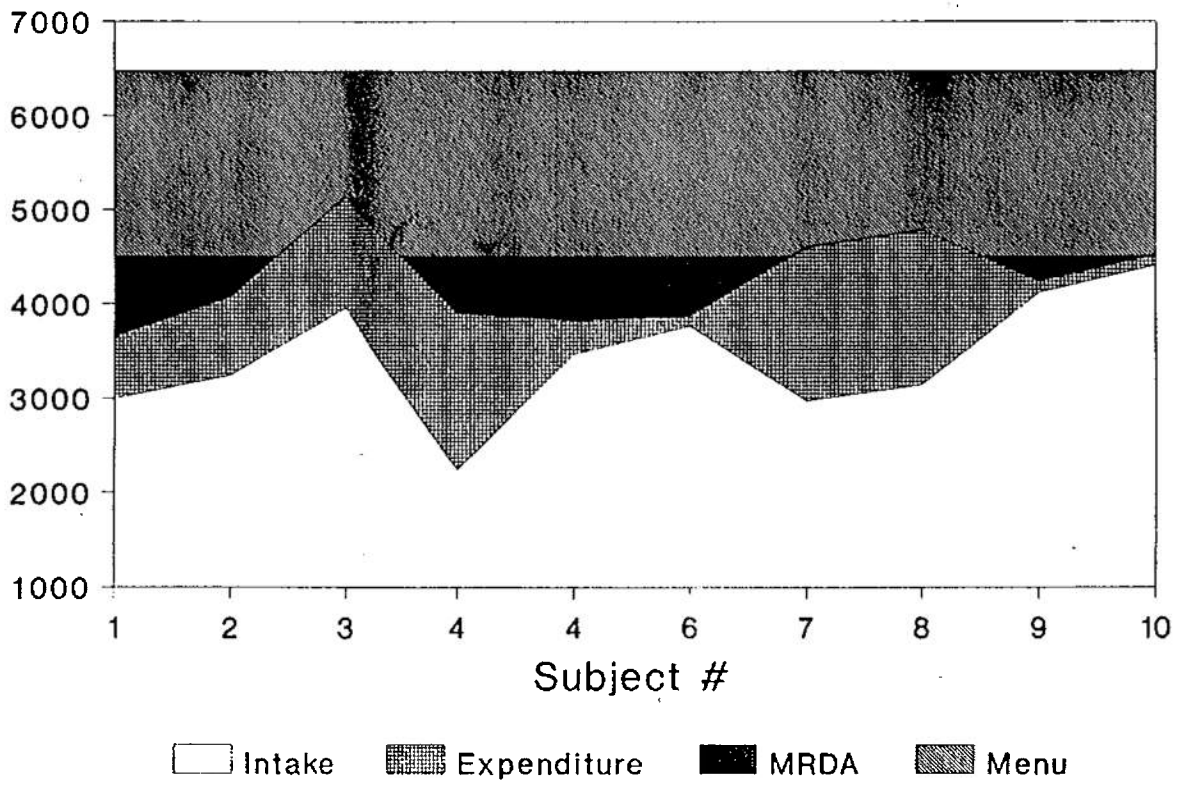
[1]Mean Energy Expenditure for 10 Days.

Figure 17. Energy and Nitrogen Balance



As a matter of interest, the subjects' (n=10) mean energy intake and expenditure during the 10-day test period were plotted (Figure 18). Also in this graph, the MRDA for energy and the amount of kilocalories supplied by the menu are indicated.

Figure 18. Energy Intake versus Expenditure



BLOOD AND URINE CHEMISTRY

The results of the blood chemistry analysis are shown in Table 38. All values were within the accepted physiological range, but some significant ($p \leq 0.05$) differences over the course of the 10-day test period were found. Specifically, significant changes were noted in total protein, NEFA, BHBA, and glycerol.

Table 38. Blood Chemistry[1,2]

	Unit	Normal Range	Pre (D-1)	Post (D+11)
Glucose	mg/dL	71 - 77	87 ± 1	85 ± 1
BUN	mg/dL	7 - 18	17 ± 1	17 ± 1
Creatinine	mg/dL	0.6 - 1.3	1.1 ± 0.1	1.1 ± 0.1
Total Protein	g/dL	6.7 - 8.2	7.5 ± 0.1	7.8 ± 0.1*
Cholesterol	mg/dL	< 200	178 ± 6	177 ± 6
Triglycerides	mg/dL	35 - 160	101 ± 14	93 ± 9
HDL-Cholesterol	mg/dL	29 - 89	48 ± 2	46 ± 2
LDL-Cholesterol	mg/dL	< 130	109.8 ± 5.5	115.5 ± 5.7
Lactate	mmol/L	0.3 - 1.3	1.07 ± 0.13	0.99 ± 0.07
Non-Esterified Fatty Acids	mmol/L	0.1 - 0.6	0.60 ± 0.05	0.35 ± 0.04*
ß-Hydroxybutyrate	mmol/L	0.0 - 0.42	0.20 ± 0.02	0.11 ± 0.01*
Glycerol	µmol/L	61 - 232	115 ± 6	60 ± 3*

[1]Mean ± SEM; n=20 from the T/MRE/T group.
[2]Means with an asterisk (*) differ significantly ($p \leq 0.05$) from the pre-test values.

Nutritional data were obtained from ketones and glucose concentrations. In both groups, the lack of glucose and ketones in the urine indicate that the subjects from both groups were not starving as was shown in the very low weight loss. In prior studies (12), the incidence of ketones has increased when troops were more active and less hydrated.

PSYCHOPHYSIOLOGICAL DATA

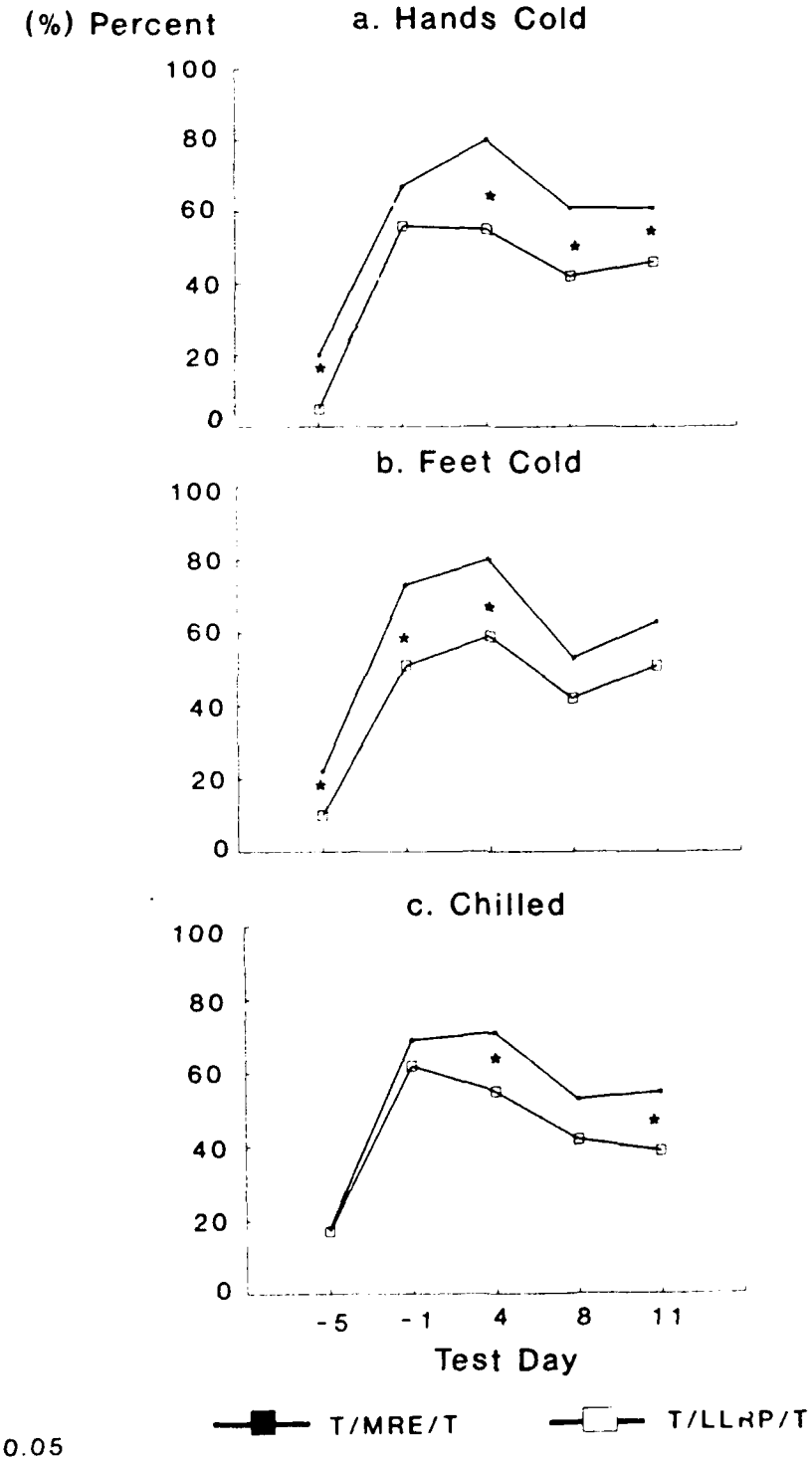
The subjects in the T/LLRP/T group reported fewer symptoms of environmental stress, fewer negative moods, and a greater number of positive moods.

Environmental Symptoms Questionnaire

Differences between the groups on those symptoms which were reported as present by 40 percent or more of the group (T/MRE/T or T/LLRP/T) on more than one administration of the questionnaire, were analyzed. Two of these items, "alert" and "good," have a reliably high incidence. The other nine symptoms were logically divided into three clusters of three items each. Cold stress was defined as a positive response to the items: "hands cold," "feet cold," and "felt chilled." Upper respiratory infection was defined as a positive response to the items: "nose stuffy," "nose runny," and "coughing." Fatigue was defined as a positive response to the items: "tired," "sleepy," and "bored." Figures 19, 20, and 21 depict the percent of soldiers in each group reporting each of the nine symptoms. In both groups the

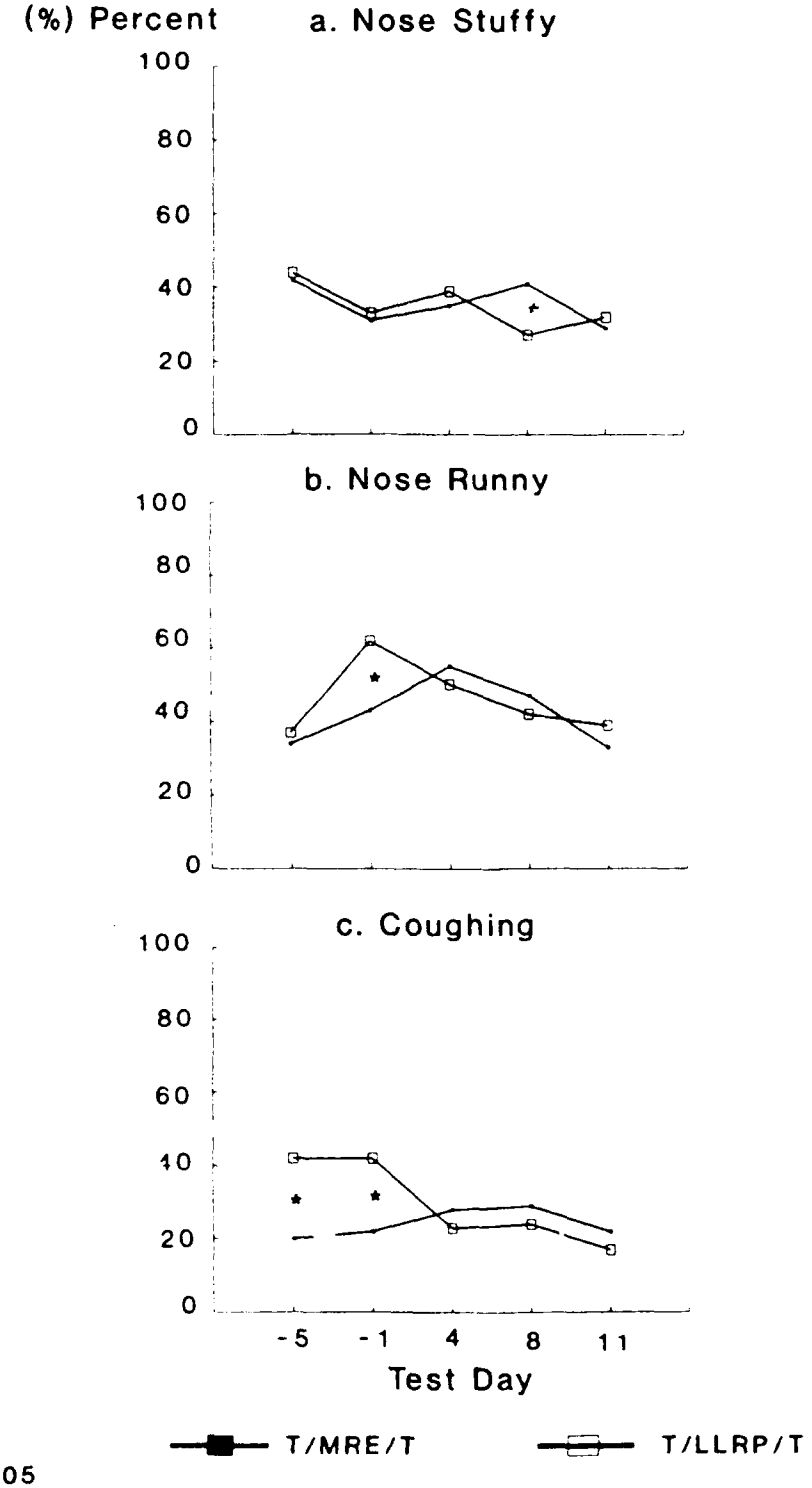
incidence of cold stress symptoms predictably reflected changes in ambient temperature (Figure 1 and 19). The T/LLRP/T group had 10-20 percent fewer subjects reporting symptoms of cold stress (Figure 19). Conversely, this group reported a 10-20 percent higher incidence of upper respiratory infection symptoms in the early part of the test (Figure 20). Although the number of T/LLRP/T subjects reporting symptoms decreased over the course of the test, the incidence of these symptoms in both groups was quite high with 30-40 percent of the subjects reporting the symptoms at any given time. This no doubt reduced their willingness and ability to appreciate subtle differences in rations. The T/LLRP/T group also reported a 10-20 percent higher incidence of fatigue (Figure 21). The incidence of fatigue decreased over time for both groups, indicating that the subjects adapted well to eating the field rations provided and to living in the extreme cold.

Figure 19. Cold Stress



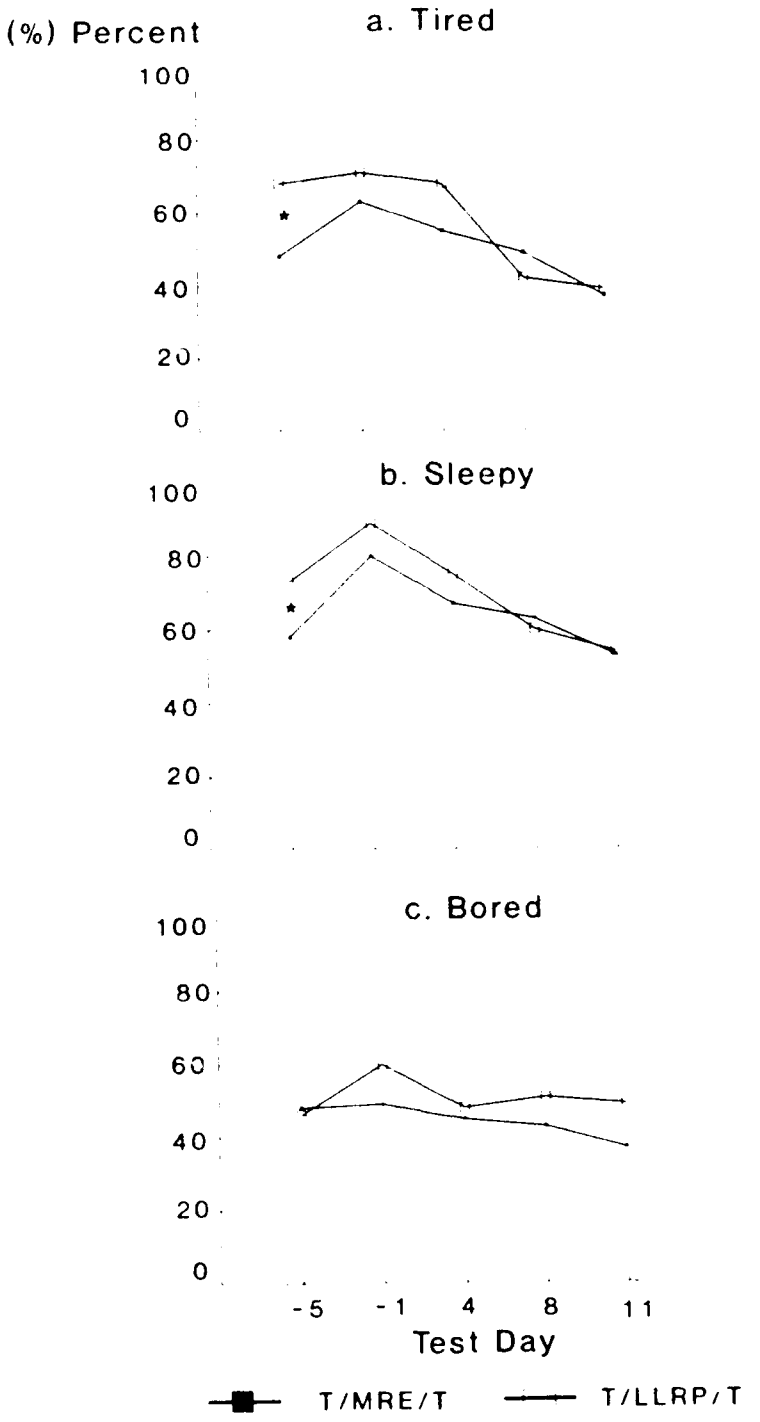
* $p < 0.05$

Figure 20. Upper Respiratory Infection



* $p < 0.05$

Figure 21. Fatigue



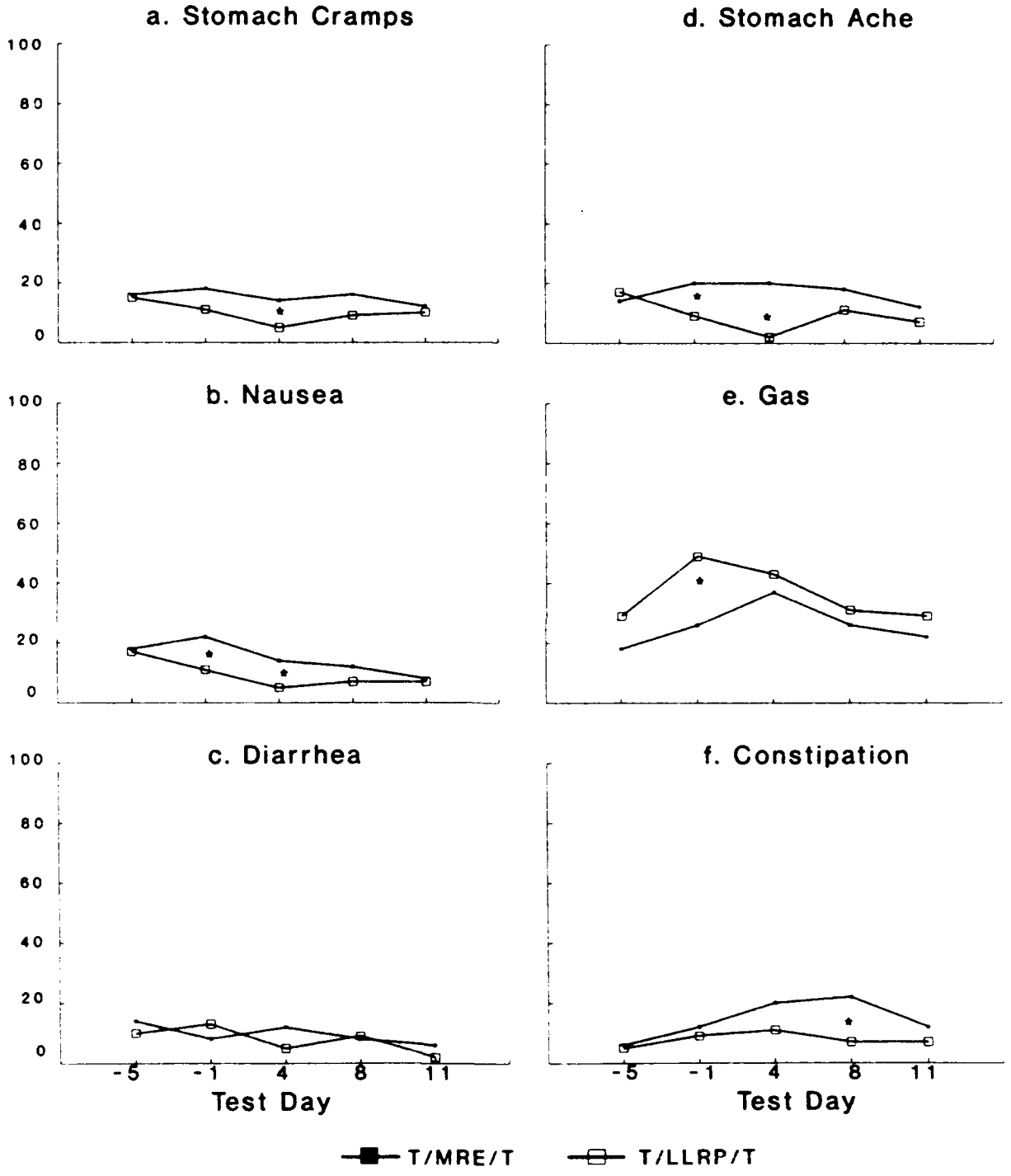
* $p < 0.05$

Food-related items such as "stomach cramps," "stomach ache," "nausea," "gas," "diarrhea," "constipation," "urinate more," "urinate less," "lost appetite," "sick," "thirsty," and "hungry" were also analyzed. Figure 22 shows the percent of subjects in each group reporting each of these symptoms.

On the third administration of the questionnaire, the T/LLRP/T group reported a significant reduction in several of these symptoms. The T/LLRP/T group had more gas and less constipation than the T/MRE/T group. Gas was more of a problem in the middle of the test for both groups, while constipation increased across days with some dissipation by the final administration of the questionnaire on D+11. Approximately 30 percent of the subjects indicated that they urinated more often than normal. This could be a function of command emphasis on hydration during the field exercise and/or a greater awareness than normal of the frequency of urination, since the field latrines were at a greater than normal distance from living and working areas. Responses to the "urinate less" indicate that 90 percent of the subjects did not feel dehydrated. A relatively large number of subjects reported hunger (50-60 percent) and thirst (40 percent).

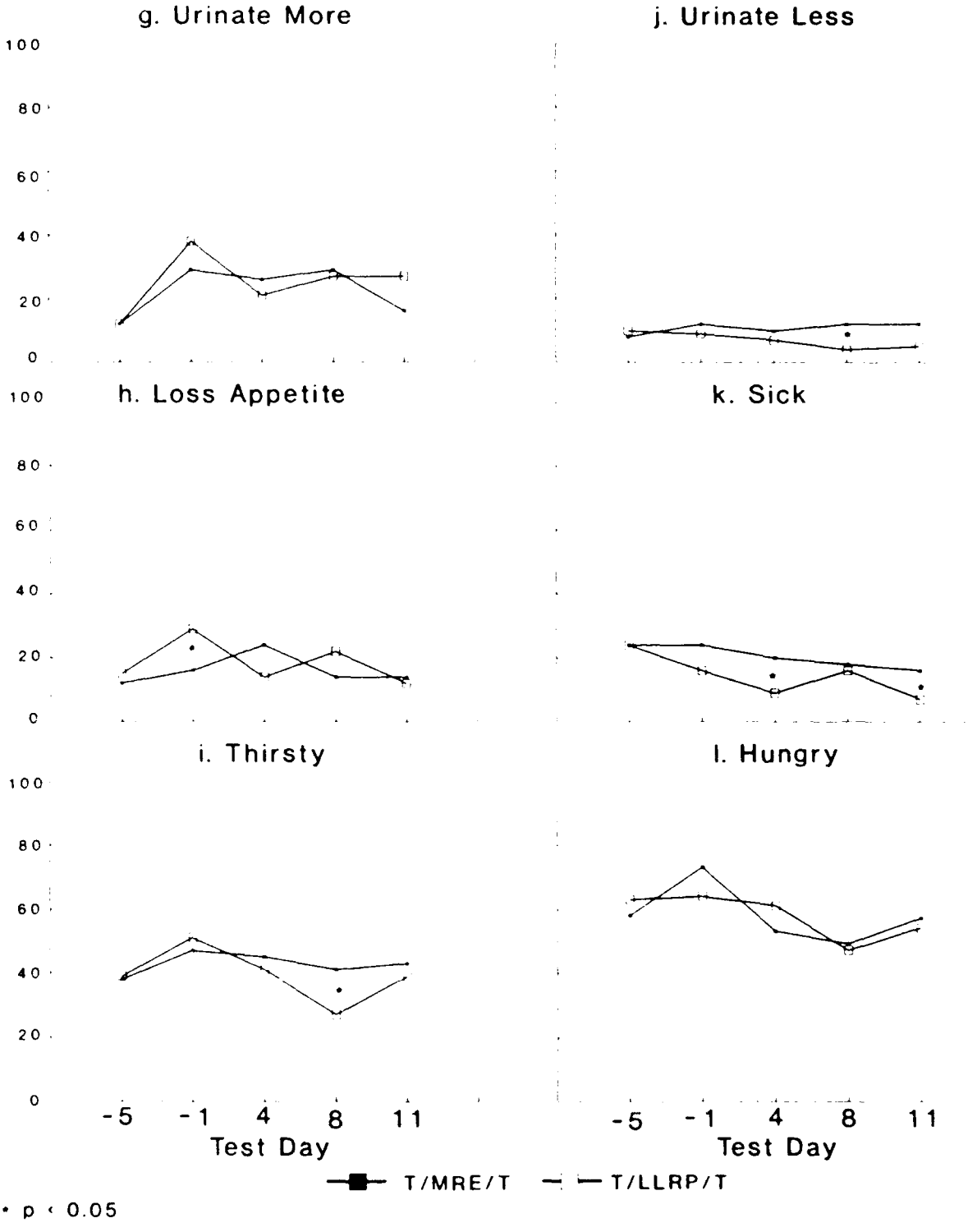
Noticeably absent from the list of prevalent symptoms were neurological symptoms associated with a significant caloric deficit, extreme fatigue, or hypothermia such as "lightheaded," "dizzy," "faint," "nauseous," "blurred vision," "coordination off," "concentration off," and "forgetfulness." Also missing from the list were items associated with exertion in the cold like "short of breath," "hard to breathe," "heart pounding," "chest pain," "stiff muscles," "muscle cramps." The absence of such symptoms again affirms how well subjects adapted to the field conditions.

Figure 22. Food-related Symptoms



* $p < 0.05$

Figure 22. Food-related Symptoms (cont)



* $p < 0.05$

Profile of Mood States Questionnaire

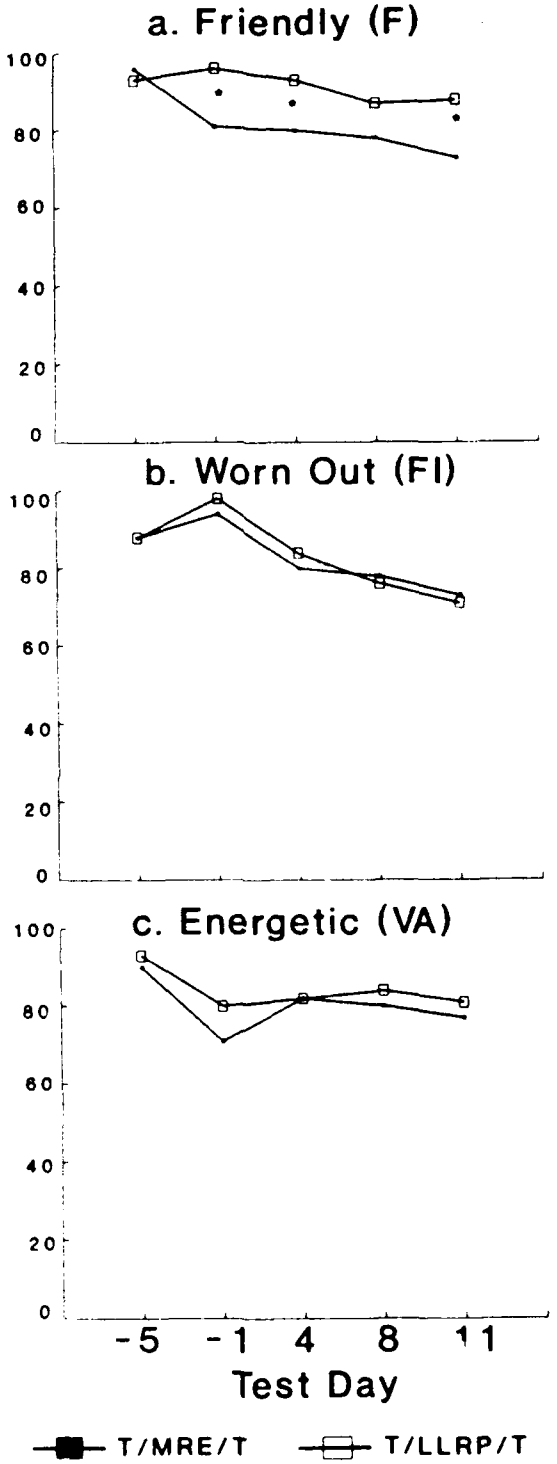
The Profile of Mood States Questionnaire (POMS) is analyzed typically (44) by dividing it into seven factors as shown in Table 39.

Table 39. Profile of Mood States Questionnaire Subscale

Subscale	Items
Friendliness (F)	"friendly," "clear-headed," "considerate," "sympathetic," "helpful," "annoyed," "good natured," "trusting"
Fatigue-Inertia (FI)	"worn out," "listless," "fatigued," "exhausted," "sluggish," "weary," "bushed"
Vigor-Activity (VA)	"lively," "active," "energetic," "cheerful," "alert," "full of pep," "carefree," "vigorous"
Confusion-Bewilderment (CB)	"confused," "unable to concentrate," "muddled," "bewildered," "efficient," "forgetful," "uncertain about things"
Anger-Hostility (AH)	"angry," "peeved," "grouchy," "spiteful," "resentful," "bitter," "ready to fight," "rebellious," "deceived," "furious," "bad-tempered"
Tension-Anxiety (TA)	"tense," "shaky," "on edge," "panicky," "relaxed," "uneasy," "restless," "nervous," "anxious"
Depression-Dejection (DD)	"unhappy," "sorry for things done," "sad," "blue," "hopeless," "unworthy," "discouraged," "lonely," "miserable," "gloomy," "desperate," "helpless," "worthless," "terrified," "guilty"

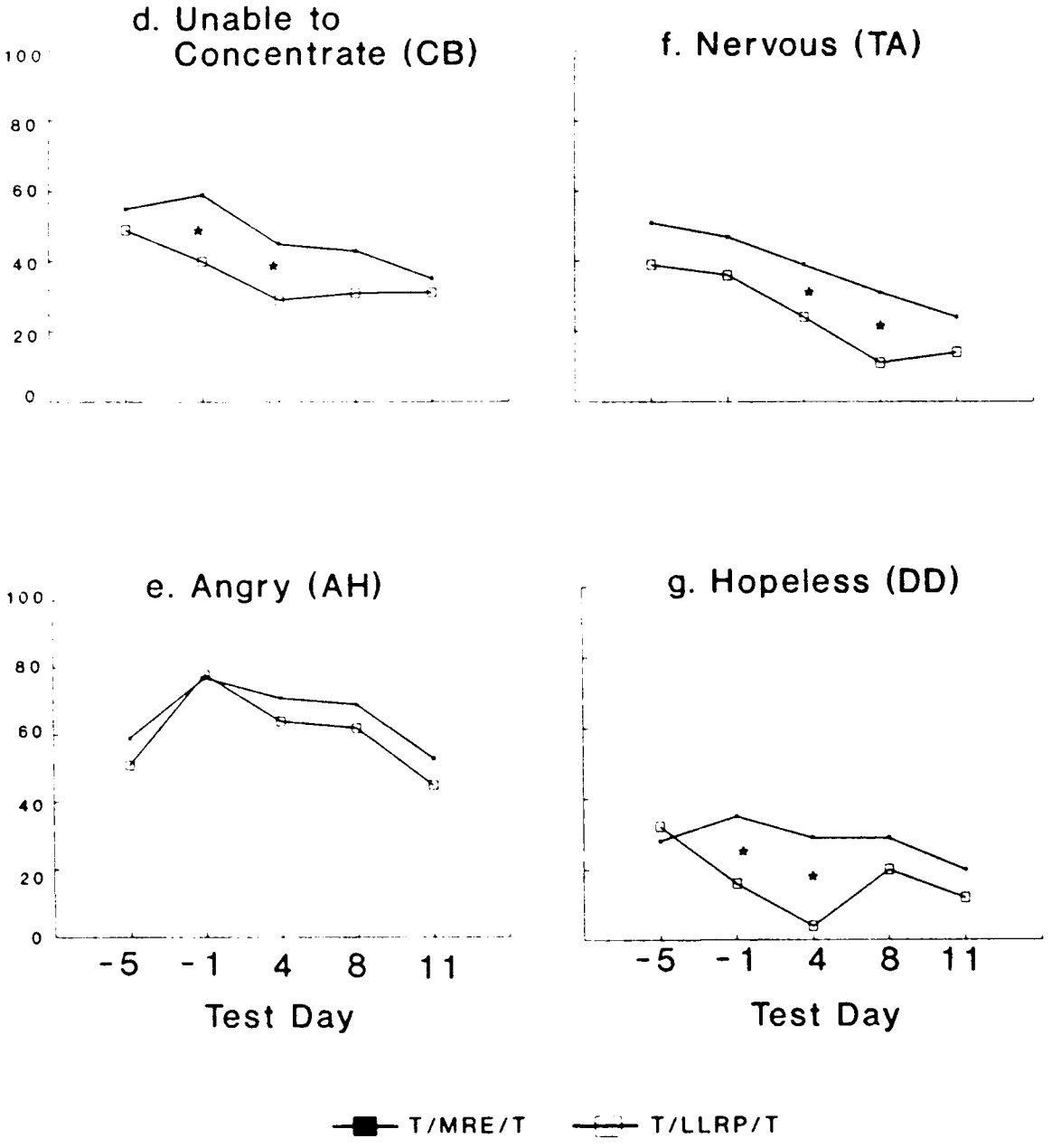
Items that typify the differences between groups on each of the subscales of the POMS are presented in Figure 23. Subjects in the T/LLRP/T group reported positive moods more often than those in the T/MRE/T group (Figure 23a). They also showed a decrease in negative moods on the third administration of the survey affirming the pattern shown on the ESQ. Data on the Fatigue-Inertia subscale were a mirror-image of those on the Vigor-Activity subscale (Figures 23b and 23c). Fatigue-Inertia decreased over time, again affirming that the rations were sufficient to sustain the subjects. Just as there was a low incidence of neurological symptoms reported on the ESQ, there was a lower incidence of reporting on the Confusion-Bewilderment and Depression-Dejection subscales than on the others.

Figure 23. POMS Items



• $p < 0.05$

Figure 23. POMS Items (cont)



• $p < 0.05$

DISCUSSION

The U.S. Army has recommended that a minimum of 4500 kilocalories per day be made available for soldiers working in the cold (9). Soldiers garrisoned in cold weather regions, if adequately clothed, require approximately the same amount of calories as soldiers engaged in similar temperate garrison activities. Energy requirements increase in proportion to the amount of time spent patrolling on foot, snowshoes or on skis (45). Small unit movements in the cold require high levels of energy expenditure to pack and move equipment, breakdown, move and re-establish bivouacs. As can be seen from this discussion, energy requirements for cold weather field operations are quite variable and difficult to estimate. We were able to arrive at specific energy expenditure values for this field exercise utilizing the doubly labeled water technique.

The doubly labeled water method has proven to be an ideal method for the measurement of energy expenditure of soldiers during field training exercises because it is non-invasive and non-restrictive. The two-point method, in which elimination rates are measured from isotope enrichments of urine samples from the first and last days of the test permits a reliable determination of total energy expenditure (33). During the period between the two urine and saliva samples, subjects are free to carry out their normal activities and are not required to maintain extensive diaries. The only requirement of the subject is to give urine and saliva samples, and to drink the heavy water. The energy expenditure of soldiers during Arctic Field Training exercises has been quite high. The energy expenditure of a light infantry unit engaged in an 8-day field training exercise in Alaska in January 1990 was 5170 kcal/day. This can be compared to the values found in the current test of 4253 kcal/day for a light infantry division field artillery unit that did not displace as frequently as the previously studied infantry unit. Further, the temperature was considerably colder (minimum temperature: -55°F) during the 1990 study. Both of these studies illustrate the high level of energy expenditure required of soldiers operating in a cold, snow covered environment.

The main concern of cold weather nutrition is providing enough warm and palatable food to meet energy demands (5). Although the subjects in this test were provided with more than an adequate supply of rations (approximately 6500 kilocalories) to match their energy expenditure of 4253 kilocalories, they did not consume enough food (mean intake approximately 3100 kilocalories) to meet this energy requirement. Several factors are known to affect field ration consumption: usual food intake including food frequency and preference

(46), ration acceptability, ease of preparation (8), availability of water (47,48,49), hypohydration (49), ration temperature, monotony (8,50,51), and palatability (50).

The usual dietary intake for both the T/MRE/T and T/LLRP/T groups was similar, indicating that differences in food intake during the test were not due to the subjects' prior eating habits. Since the subjects were not allowed to consume alcoholic beverages while in the field, the usual intake compared with the test results does not include the usual energy intake from alcohol which, in either case, was inconsequential, 256 and 140 kilocalories for the T/MRE/T and T/LLRP/T groups, respectively. On making this comparison (Tables 24 and 25), it is important to keep in mind that the measurements of these dietary intakes were different. While the measurement during the test was quantitative with the visual estimation technique, the usual intake was measured semi-quantitatively with a food frequency questionnaire. It is difficult to predict how these intakes would have compared to each other if the same type of measurement would have been used. Further, the foods reported on the Health Habits and Diet Questionnaire were preferential and self-selected, which facilitated recording of dietary intake data. Another limitation of the questionnaire is the likelihood of over or under estimating food frequencies, especially when the consumption of a particular food overlaps with other foods. For example, when whole, low-fat, and skim milk are consumed interchangeably, it is possible to mark each of these categories more frequently than actually consumed. Tables 24 and 25 show that the subjects' nutrient intake during this test was less than their usual intake, and it cannot be determined if the decreased intake is due to the limitations mentioned or to the rations, field environment and/or arctic weather. However, the deficit within groups was similar, indicating that the subjects did not favor one ration over the other.

The usual nutritional intake of the subjects participating in this test was above the typical intake of the general male population in their age group (Table 40) (52). This is probably a reflection of the more physically active military life that the soldiers have compared to their civilian counterparts. However, the macronutrient distribution was similar to the National Surveys reports: 15.5 percent protein, 46 percent carbohydrate and 36 percent fat (See Table 8).

Table 40. Comparison of Usual Intake of Subjects with Results from Nutrition Surveys

	Unit	T/MRE/T	T/LLRP/T	NHANES II 1976-1980	CSFII 1985
Energy	kcal	3927	3859	2899	2806
Protein	g	153	149	113	105
Carbohydrate	g	407	405	305	317
Fat	g	168	173	118	115
Iron	mg	23	24	17.6	16.7
Calcium	mg	1649	1384	1096	1067

Further, their nutritional intake compares with that obtained in a preceding nutrition field study (Table 41) (2), suggesting that the feeding regimens used in this test did not promote better nutritional intake than other regimens had provided previously.

Table 41. Comparison of Nutritional Intake with Previous Study

	Unit	1991[1]		1990[2]	
		T/MRE/T	T/LLRP/T	3MRE +Suppl	RCW
Energy	kcal	3271	3035	2729	2943
Protein	g	134	111	114	97
Carbohydrate	g	375	376	320	421
Fat	g	138	123	110	102
Iron	mg	19	17	15	12
Calcium	mg	1445	1107	812	731

[1]Current test. [2]Reference #2.

While the T/LLRP/T group gave the LLRP higher ratings than the T/MRE/T group gave the MRE, the amount consumed of the two rations did not differ. In general, when there were differences in ration ratings between the groups, the T/LLRP/T group tended to give higher ratings than the T/MRE/T group did. The T/LLRP/T group may have been giving higher ratings because of the novelty of the new ration, because the LLRP was packaged in a commercial packaging (while the MRE package was green) or because they were comparing it to the MRE, which most had eaten before. In fact, the T/LLRP/T gave significantly higher

ratings for the candies which are similar to the MRE candies. They also rated several of the dinner, but not breakfast, food groups significantly higher than the T/MRE/T group did, even though both groups had the same items. This difference may have been caused by a "halo effect" of the novel ration. Because they had the LLRP, a new ration, to look forward to for lunch, the soldiers may have been more inclined to reduce consumption of the monotonous breakfast meal and at least partially make up for this at the lunch meal. They skipped more breakfast meals than the T/MRE/T group did. The T/MRE/T group did not have the same situation and skipped more lunch meals. The acceptability ratings tend to reinforce these patterns. The breakfast meal was rated similarly by both groups while the lunch and dinner meals were rated higher by the T/LLRP/T group, though they did not eat more at dinner but skipped more meals.

The T/LLRP/T group rated the LLRP as being easier to use than the T/MRE/T group rated the MRE. Although most foods in the MRE are moist packed and can be eaten as such, they can readily freeze requiring thaw-out time. The LLRP is too dry to freeze, but the entrees are dehydrated and require water to make them palatable. The logistical problem of ensuring an adequate supply of clear, unfrozen water to troop units increases under arctic conditions. In this test, these problems of dehydrated rations were not as apparent because water was readily available and because these rations were consumed only once a day.

The 6th ID (L) has an operational standard requiring each soldier in the field to consume at least 4 L of water per day. The source of this water is from a central supply point which obtains its water from an unfrozen source (stream or lake), treats the water and delivers the water to the field in a heated water buffalo. Water is carried to the individual units in 5 gallon cans (either metal with ceramic liners or plastic). Individuals or units will only melt snow or ice in emergency situations. This method of delivering water can result in a large number of the water cans being frozen, but in a stable field situation with heated tents, freezing of water in the water cans can be prevented, assuring a supply of unfrozen water. In this training situation, movement was minimal and the water supply was quite adequate as reflected in the average amounts consumed (Figure 12).

Hydration status was determined from the urine specific gravity (SG) measurement which is a variable and non-specific measure of hydration status. Urine SG is a useful non-invasive screening test which may serve as a general indicator of dehydration (53). Measuring SG in the first urine of the morning as done in this test helps to assure a representative urine sample of uniform composition. However, due to operational requirements, not all subjects

were asleep in the hours preceding the collection. Still, these data were used to determine if a similar hydration status existed between the two groups using different rations. Human use test subject requirements required notification of individuals that exceeded the clinical dehydration level (SG ≥ 1.030) for two consecutive days to increase their water consumption. The SG range for a well-hydrated and well-rested individual is 1.015 to 1.022 (43). This group was not always well rested since many fire missions occurred at night and would explain why the daily average SG values were in the upper ranges (Figure 13). Overall, water consumption and hydration status were similar for both groups, and hydration probably played a minor role in differences between the two feeding regimens.

The majority of the subjects reported that they ate their meals in a heated shelter, however the LLRP was rated as being warmer than the MRE. These results were indicative of the current field exercise conditions in which all soldiers had access to a Yukon stove. While the T/LLRP/T group heated water to prepare their LLRP, the T/MRE/T group had difficulties with their MRE freezing. Further, it is very troublesome to heat the frozen MRE entree on the Yukon stove because often the pouch, and usually the food, burns. Using the canteen cup to heat the MRE entree represents an additional burden of cleaning it with a limited water supply. Although the frozen MRE entree can also be heated by placing the pouch in warm water, the disparity between the length of the pouch and the depth of the canteen cup makes this difficult. Thus, the subjects tended to eat the MRE entrees cold which may have affected the acceptability ratings and consumption. A flameless ration heater for the MRE might be useful under these conditions. Otherwise, the amount of time, fuel and water required to thaw a frozen MRE entree and heat it to a hot or warm temperature makes simply adding hot water to a dehydrated LLRP an attractive alternative.

Other than the fruit and milk often being frozen, there were few problems reported with the temperature of the T Ration items. The incidence of frozen milk made it difficult for the subjects to consume the cereal, which was a very popular item. The subjects especially like having cold cereals packaged in a bowl container eliminating the need for using their canteen cup, and suggested doing the same with the oatmeal. The heated items usually got to the soldier while they were still hot or warm. This was due to the efficient serving method and the insulating styrofoam clam shell food container of the 18-Man Arctic Tray Pack Ration Module.

Monotony is a major contributor to decreased ration acceptability and dietary intake. It is a positive function of the number of times a food item has been consumed, totally or in part,

and it is measured and expressed by a decrease in food acceptance (51). The subjects in this 10-day test had access to twelve MRE menus or eight LLRP menus, and they were offered six breakfast and seven dinner menus from the Arctic T Ration. Nevertheless, menu variety was not obvious with six of the breakfast meals having sausage links, and eight of the breakfast meals having "egg squares" (both scrambled and omelet were served in squares). In part, the rations are monotonous because their components undergo the same processing. As a soldier consumes a ration at different intervals over time, acceptability will decline for each interval it is consumed resulting in a decrease in consumption. It would be expected that in a short test like this one, monotony would not be an issue. Further, when monotony is the problem, food intake tends to decrease over time. Likewise, palatability progressively declines with the repetitive consumption of a food (46,50) with limited future recovery (50). Figure 5 shows a fairly constant intake over time suggesting that, in this test, monotony was not necessarily a confining factor. This is not to say that the subjects may have been already bored with some of the rations because of their previous field training exercises (1,2,12,13,49) and therefore the decline in food consumption over time was not as evident.

Even though the decrease in food consumption during the test cannot be explained with the available data, the results indicate that both groups (T/MRE/T and T/LLRP/T) had similar eating habits prior to the test, and that both groups' food intake decreased equally during the test period, suggesting that this occurrence was not ration (MRE or LLRP) dependent.

The low energy intake (67 and 73 percent of energy MRDA for T/MRE/T and T/LLRP/T, respectively) was due to the amount of carbohydrate and fat consumed, which was less than the amount recommended by the MRDA (9). Provision of greater quantities of carbohydrate in warming beverages would address both the low energy intake and the marginal carbohydrate intake. It is interesting to note that, in spite of the energy deficit, the subjects in the current test consumed adequate levels of vitamins and minerals, except for vitamin B_6 for the T/LLRP/T group. The intake of several of the nutrients could not be assessed because of insufficient nutrient composition data available to make a meaningful estimate of their consumption from the T Ration, MRE and/or LLRP. Table 11 indicates that the test rations still provided an adequate amount of these nutrients. Considering that in reality the rations provided an unknown amount above the one reported, the amount of vitamin A provided could be of concern because of the possible toxic manifestations. However, these symptoms are not usually seen unless daily intake of 50,000 IU or more of vitamin A is sustained, which is very difficult to achieve with diet alone. Vitamin A intake of the subjects in this test was more than 6,199 IU and 4,640 IU for the T/MRE/T and T/LLRP/T groups, respectively; it is

doubtful that the subjects' intake was even close to toxic levels.

In spite of the relatively low fat intake, cholesterol intake was fairly high for both groups (once again consider that the amount reported, particularly for the LLRP, is an underestimation). The subjects' intake was more than 415 mg for the T/MRE/T and more than 274 mg for the T/LLRP/T. Serum cholesterol was virtually unchanged for the subjects participating in this test. However the association of a high intake of dietary cholesterol with increased risk for cardiovascular disease, and the high cholesterol content of the feeding regimen provided (> 549 mg and > 445 mg for the T/MRE/T and T/LLRP/T groups, respectively) could be cause for concern for prolonged feeding situations, and should be taken into consideration when planning operational rations for extended field operations. Most of the cholesterol was in the T Ration, specifically in the breakfast menus (303 mg). The subjects' cholesterol intake at the breakfast meal was 262 mg for the T/MRE/T group and 204 mg for the T/LLRP/T.

The subjects from both groups were well within the Army Weight Standards (26) at the beginning and at the end of the test. Both groups lost a similar amount of body weight, indicating that one ration regimen was not favored over the other. Although the body weight loss was significant for both groups, it was within the guidelines of three percent weight loss for operational rations. Since body weight measurements were obtained only at the beginning and at the end of the study, there is not a pattern of weight change to help identify its cause. However, since the subjects were hydrated (Figure 13), energy imbalance (Figure 5) was probably responsible for the weight loss observed. Considering an energy expenditure of 4253 kilocalories, the T/MRE/T subjects had a mean energy deficit of -982 kilocalories while the T/LLRP/T subjects had a mean energy deficit of -1218 kilocalories. Thus, it would have been expected for subjects in the T/LLRP/T group to lose more body weight than subjects in the T/MRE/T group. However, subjects in the T/MRE/T group lost more body weight (-1.97 kg) than the subjects in the T/LLRP/T group (-1.06 kg) did. All indications are that both groups were under similar environmental and operational conditions, and the activity patterns showed no gross differences in physical activity (Figure 14). Considering the wide range seen in energy expenditure (3650 to 5104 kcal/day), it could be speculated that the subjects in the T/LLRP/T group probably expended less energy (work) than the T/MRE/T group and were at the lower end of the energy expenditure spectrum. A larger sample size and including subjects from the T/LLRP/T group would have been helpful to explain the discrepancy observed between body weight loss and energy deficit. Still, the increase in vigor and decrease in fatigue over time affirms that the rations were sufficient to

sustain the energy of subjects engaged in cold weather operations (Figures 23b and 23c) in spite of the body weight loss (Figure 2).

The majority of the body weight loss appeared to have come from the body fat compartment, as indicated by the changes in percent body fat. However, the expected increase in urinary ketone bodies that normally occurs with an increased fat metabolism was not observed in this test. Since the blood chemistries were obtained only twice during the 10-day test (pre- and post-testing), the data obtained is not indicative of which nutrient was predominantly oxidized for energy. All the subjects were within the U.S. Army percent body fat standards of less than 22 percent (26). The amount of body fat lost was of no clinical consequence.

Further, the lack of a preponderance of significantly negative nitrogen balances in this test illustrates that the energy deficit was not exerting a severe metabolic stress. To assess nitrogen balance, D+9 was chosen as a representative day that would not be affected by the sometimes erratic food intake patterns encountered during the first few days of a field deployment. It also permitted a stable 8-day dietary pattern to develop prior to evaluating nitrogen intake and excretion patterns. Fecal and sweat nitrogen collections were impractical under these cold weather field conditions, hence a constant 2.0 g/man/day was assumed for these avenues of nitrogen excretion. Since the major metabolic route of nitrogen excretion is via the urine, it is unlikely that this relatively small and constant source of nitrogen excretion would result in a greater than 10 percent error in estimation of total daily nitrogen excretion, even if a small deviation from the fecal constant did occur.

The negative nitrogen balances displayed by 9 out of 19 subjects were probably not attributable to cold per se, but most likely were the result of the overall increased energy requirement for work in the cold due to slippery surfaces, heavy clothing and packs. Little information exists in the literature on the specific effects of cold on nitrogen excretion. Presumably, cold would exacerbate a negative energy situation but would not itself be a significant factor if energy balance was positive. Therefore, the increased nitrogen excretion under the conditions of this test was most likely related to the existing imbalance between energy intake and energy expenditure (the average energy intake of these 19 subjects was 3311 kcal/day, while their energy expenditure was 4253 kcal/day). The nine subjects in negative nitrogen balance were in a greater negative energy balance than the eleven subjects in positive nitrogen balance (energy intake of 2531 kcal/day versus 3641 kcal/day). Likewise, as a consequence of reduced energy intake (food consumption), carbohydrate

intakes were lower for the nitrogen negative subjects (323 g/day) than for the nitrogen positive ones (484 g/day). This relationship between carbohydrate and protein is an important determinant of nitrogen balance at low levels of dietary protein (54). However, the mean protein intake of these 19 subjects was 30 percent higher (Table 36) than the MRDA of 100 g/day (9) (which probably explains the slight increase in serum total protein seen), thus in this test, nitrogen balance was primarily determined by energy balance (55). Inadequate energy intake can lead to subsequent breakdown of dietary or body protein for energy. Had the military rations been lower in total protein content, the energy deficit might have resulted in a greater loss of body muscle mass (negative nitrogen balance). As it currently stands, the relatively high protein content of military rations may be particularly beneficial when rations are not consumed in adequate quantities to meet energy demands. The provision of relatively adequate dietary protein in the absence of adequate dietary energy may help spare muscle amino acid degradation, preventing or lessening negative nitrogen balances.

The psychophysiological data indicate that both groups were stressed by the change from garrison to field operations. However, the decrease over time in negative symptoms and moods indicates that neither group was overly stressed by the field exercise and that the rations provided were sufficient to sustain them. The *Environmental Symptom Questionnaire* (ESQ) is characterized by a zero-response bias; that is, the nature and order of the questions encourage subjects to identify only those symptoms which *significantly* affected them on that day (18). As is typical of a healthy military population, there was a low incidence of ratings greater than two (43,56,57,58). On the other hand, the Profile of Mood States (POMS) is not characterized by a zero-response bias: that is, the typical subject in a healthy military population rarely rates the majority of moods as "zero" or absent (43,56,57,58).

Responses on the psychophysiological questionnaire portrait a different profile of gastrointestinal illness from that of the final questionnaire (Human Factors Questionnaire). These two questionnaires are not comparable. The psychophysiological questionnaire asked subjects to indicate the degree to which a symptom was present on a given day, while the final questionnaire asked subjects to retrospectively evaluate whether the frequency of symptoms was normal for them. The data from these two different methods (time sampling versus event reconstruction) taken together indicate that gastrointestinal illness was not a significant problem during this test.

Two factors made the analysis and interpretation of symptoms and moods difficult: the use of intact groups rather than a random assignment of subjects to treatment groups and the collection of ordinal data. These factors precluded the use of traditional parametric analyses of variance to evaluate the details of the repeated measures design. Nevertheless, the data made an unambiguous case for complex interactive effects. There is evidence that the groups diverged over the course of the test, only to converge at the end. It cannot be determined if the changes observed in symptoms and moods were the direct result of the field feeding regimens.

To avoid the problems with analysis and interpretation of symptoms and moods, future studies should use matched subsamples of the intact groups and surveys which gather interval data. Surveys which ask subjects, "How many times today have you felt happy, cold, tired, and so on?" would yield interval data which could be analyzed using a traditional repeated measures analysis of variance. Further, supplement the symptoms and mood data with regular assessments of the operational, environmental, and psychosocial events affecting subjects, and use that data as blocking factors or covariates in the analysis to build an unambiguous picture of the contribution of feeding regimens to overall health and performance.

CONCLUSION

The Cold Weather Army Field Feeding System (18-Man Arctic Tray Pack Ration and Meal, Ready-to-Eat) provides adequate energy and nutrients to meet the soldiers' Military Recommended Dietary Allowances (MRDA) in a cold environment (< 57.2°F). However, the rations may not be consumed in sufficient amounts to provide enough energy.

The rations provided in this test (18-Man Arctic Tray Pack Ration Module, Meal, Ready-to-Eat, and Long Life Ration Packet) were acceptable to the subjects, when they could be consumed warm or hot. Since neither feeding regimen, T/MRE/T or T/LLRP/T, was better than the other in preventing body weight loss or maintaining nutrition and hydration status, it was concluded that the choice of these ration combinations depends upon the environmental conditions and the mission parameters of soldiers operating in an arctic environment. The final decision should be made very carefully to optimize the performance of the soldiers and may depend upon availability of water and the capability of soldiers to heat water. In some cases, it may be advisable to issue a combination of both the MRE and the LLRP so the

soldiers can cope with a variety of conditions.

RECOMMENDATIONS

The following recommendations may help increase the food consumption of the soldiers thus increasing their energy intake:

1. To increase the acceptability of 18-Man Arctic Tray Pack Ration:
   a. Provide the full variety of menus available to prevent or delay decreased intake due to monotony.
   b. Provide variety within the breakfast menu (for example by serving the scrambled eggs whipped with added milk and the omelets in "squares").
   c. Transport the milk and canned fruit in heated containers to prevent freezing.
   d. Provide disposable bowls for the oatmeal.
   e. Decrease the serving size (currently six) and the frequency in which the sausage links are served.
   f. Add bacon and ham to the T-Ration breakfast menu.
   g. Continue efforts to develop alternative breakfast items like pancakes, muffins, waffles and such that would add variety while providing choices lower in cholesterol.

2. Insure that a heating device such as the Flameless Ration Heater Pad[7] be included with the Meal, Ready-to-Eat and Long Life Ration Packet when these rations are provided in the Arctic.

3. Insure that there is a hot water supply when the Long Life Ration Packet is provided in the Arctic.

4. Insure that there is enough water for cold weather operations and continue enforcing water discipline.

[7]Zesto Therm, Inc., 10274 Alliance Road, Cincinnati, OH 45242.

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APPENDICES

APPENDIX A

Volunteer Agreement Affidavit

VOLUNTEER AGREEMENT AFFIDAVIT

For use of this form, see AR 70-25, the proponent agency is OTSG

PRIVACY ACT OF 1974

Authority	10 USC 3013, 44 USC 3101, and 10 USC 1071-1087
Principle Purpose	To document voluntary participation in the Clinical Investigation and Research Program. SSN and home address will be used for identification and locating purposes
Routine Uses	The SSN and home address will be used for identification and locating purposes. Information derived from the study will be used to document the study, implementation of medical programs, adjudication of claims, and for the mandatory reporting of medical conditions as required by law. Information may be furnished to Federal, State and local agencies
Disclosure	The furnishing of your SSN and home address is mandatory and necessary to provide identification and to contact you if future information indicates that your health may be adversely affected. Failure to provide the information may preclude your voluntary participation in this investigational study

PART A(1) - VOLUNTEER AFFIDAVIT

Volunteer Subjects in Approved Department of the Army Research Studies

Volunteers under the provisions of AR 40-38 and AR 70-25 are authorized all necessary medical care for injury or disease which is the proximate result of their participation in such studies.

I, _____, SSN _____.

having full capacity to consent and having attained my _____ birthday, do hereby volunteer/give consent as legal representative for _____, to participate in Nutrition and Hydration Status of Soldiers Consuming the 18 Man Arctic Tray Pack Ration Module with Either Meal, Ready-To-Eat or Long Life Ration Packet During a Cold Weather Field Training Exercise (HURC #433)

(Research Study)

under the direction of MAJ Nancy King

conducted at Fort Greely, Alaska

(Name of Institution)

The implications of my voluntary participation/consent as legal representative, duration and purpose of the research study; the methods and means by which it is to be conducted, and the inconveniences and hazards that may reasonably be expected have been explained to me by

Contact telephone(s): MAJ Nancy King AV 256-5309 or (508)651-5309

I have been given an opportunity to ask questions concerning this investigational study. Any such questions were answered to my full and complete satisfaction. Should any further questions arise concerning my rights/the rights of the person I represent on study-related injury, I may contact

Office of Chief Counsel

at US Army Natick Research, Development and Engineering Center (508)651-4322

(Name, Address and Phone Number of Hospital (Include Area Code))

I understand that I may at any time during the course of this study revoke my consent and withdraw/have the person I represent withdrawn from the study without further penalty or loss of benefits, however, I/the person I represent may be required (military volunteer) or requested (civilian volunteer) to undergo certain examination if, in the opinion of the attending physician, such examinations are necessary for my/the person I represent's health and well-being. My/the person I represent's refusal to participate will involve no penalty or loss of benefits to which I am/the person I represent is otherwise entitled.

_____

PART A (2) - ABSENT VOLUNTEER AFFIDAVIT (MINOR CHILD)

I, _____, SSN _____ having full capacity to consent and having attained my _____ birthday, do hereby volunteer for _____ to participate in _____

(Research Study)

under the direction of _____

conducted at _____

(Name of Institution)

(Continue on Reverse)

PART A(2) - ASSENT VOLUNTEER AFFIDAVIT (*MINOR CHILD*) (*Cont'd.*)

The implications of my voluntary participation; the nature, duration and purpose of the research study; the methods and means by which it is to be conducted; and the inconveniences and hazards that may reasonably be expected have been explained to me by

_____

I have been given an opportunity to ask questions concerning this investigational study. Any such questions were answered to my full and complete satisfaction. Should any further questions arise concerning my rights I may contact

_____

at _____

(Name, Address, and Phone Number of Hospital (Include Area Code))

I understand that I may at any time during the course of this study revoke my assent and withdraw from the study without further penalty or loss of benefits; however, I may be requested to undergo certain examination if, in the opinion of the attending physician, such examinations are necessary for my health and well-being. My refusal to participate will involve no penalty or loss of benefits to which I am otherwise entitled.

_____

PART B - TO BE COMPLETED BY INVESTIGATOR

INSTRUCTIONS FOR ELEMENTS OF INFORMED CONSENT *(Provide a detailed explanation in accordance with Appendix E, AR 40-38 or AR 70-25.)*

We are requesting your participation in a 10 day research study to evaluate the suitability and acceptability of the Meal, Ready-to-Eat (MRE), Long Life Ration Packet (LLRP) and Arctic Tray Pack rations. The study will be conducted in conjunction with your routine cold weather military training. Since this is a ration test, we need for you to refrain from eating any foods or beverages other than the military rations given to you. You will not be allowed to bring your own food or beverages into the field.

Before deploying, you will be briefed on how to fill out any forms or questionnaires that will be used during the study. The questionnaires will help us characterize your background, your usual eating habits, your health and mood. This information will assist us when analyzing the results. The final questionnaire that you will complete on the last day of the exercise will provide the ration developers with information needed to improve the taste, packaging and ease of use of the rations. You will have a total of 35 questionnaires and forms to fill out during the entire study. None of them should take you longer than 15 minutes to complete.

Your height will be measured at the beginning of the study. You will be weighed two times during the study to see if you were able to eat enough food to maintain your body weight. Your neck and abdomen will also be measured two times during the study. These measurements will indicate if your percent body fat changed during the study period. The pre-measurements and post-measurements will take only 10 minutes each.

I do ☐ do not ☐ *(check one & initial)* consent to the inclusion of this form in my outpatient medical treatment record.

SIGNATURE OF VOLUNTEER	DATE	SIGNATURE OF LEGAL GUARDIAN *(If volunteer is a minor)*
PERMANENT ADDRESS OF VOLUNTEER	TYPED NAME OF WITNESS	
	SIGNATURE OF WITNESS	DATE

REVERSE OF DA FORM 5303-R, MAY 88

PART B - TO BE COMPLETED BY INVESTIGATOR (cont'd)

To determine your nutritional intake, you will be asked to record any MRE or LLRP items consumed on a daily diet log (diary) which will be given to you every day. You also need to record your water and fluid intakes on this log. Trained data collectors will record your consumption of foods served to you from the serving line at breakfast and dinner. Before you begin eating, we will ask you to show your tray to the data collectors. They will record the amount of food very quickly without touching it or letting it get cold. When you have completed your meal, you will again show your tray to the data collectors who will record the amount of food remaining.

You will be asked to collect a small sample of your first morning urine each day while you are in the field. We will provide the necessary containers for you to use. The urine will be analyzed to establish whether or not you drink sufficient water/fluids.

We also may want to record your activity during this field exercise in the cold environment. You may be asked to wear an activity monitor during the entire study period. The activity monitor consists of a small battery-powered device so there is no risk of electrical shock. The monitor is simply strapped to your wrist; it should not interfere with your normal training duties. You may be asked to record all your physical activity in a physical activity diary. Completing this diary will take only 10 minutes of your time.

Participation in this study is on a voluntary basis. If you choose not to take part or if you choose to withdraw from the study, you will not be required to fill out the forms/questionnaires or provide urine samples. However, you will not be excused or withdrawn from the field. The decision to remove you from the field would be made by the local commander.

You will receive no direct benefit from participating in this study other than to know that you contributed valuable information to help shape the future of the Army Field Feeding System. Your data, comments and suggestions will be carefully evaluated and may lead to beneficial changes in the design and/or content of these rations. Also, you will be notified if you are getting dehydrated and need to drink more fluids.

The information you give, together with the data obtained from you, will be treated in the strictest confidence. However, since you are in the military, complete confidentiality cannot be promised since information bearing on your health may be required to be revealed to appropriate medical or command authorities. Also, information about you may be inspected by the Institutional Review Boards for Human Studies and officials of the US Army Medical Research and Development Command. The data gathered in this study may be published in a scientific journal or meeting, but you will not be individually identified in any presentation of the study results.

Before you sign this document, be sure that you have read it and fully understand it. If you have any questions at any time concerning this study, please ask. A copy of this Agreement Form is provided for you to keep.

SIGNATURE OF VOLUNTEER	DATE SIGNED	SIGNATURE OF LEGAL GUARDIAN (If volunteer is a minor)	
PERMANENT ADDRESS OF VOLUNTEER	TYPED OR PRINTED NAME AND SIGNATURE OF WITNESS		DATE SIGNED

Reverse of DA FORM 8303-R.

VOLUNTEER AGREEMENT AFFIDAVIT

For use of this form, see AR 70-25; the proponent agency is OTSG

PRIVACY ACT OF 1974

Authority: 10 USC 3013, 44 USC 3101, and 10 USC 1071-1087

Principle Purpose: To document voluntary participation in the Clinical Investigation and Research Program. SSN and home address will be used for identification and locating purposes.

Routine Uses: The SSN and home address will be used for identification and locating purposes. Information derived from the study will be used to document the study, implementation of medical programs, adjudication of claims, and for the mandatory reporting of medical conditions as required by law. Information may be furnished to Federal, State and local agencies.

Disclosure: The furnishing of your SSN and home address is mandatory and necessary to provide identification and to contact you if future information indicates that your health may be adversely affected. Failure to provide the information may preclude your voluntary participation in this investigational study.

PART A(1) - VOLUNTEER AFFIDAVIT

Volunteer Subjects in Approved Department of the Army Research Studies

Volunteers under the provisions of AR 40-38 and AR 70-25 are authorized all necessary medical care for injury or disease which is the proximate result of their participation in such studies.

I, _____, SSN _____.

having full capacity to consent and having attained my _____ birthday, do hereby volunteer/give consent as legal

representative for _____ to participate in _____

Energy Expenditure for HURC #433

(Research study)

under the direction of MAJ Nancy King

conducted at Fort Greely, Alaska

(Name of institution)

The implications of my voluntary participation/consent as legal representative; duration and purpose of the research study; the methods and means by which it is to be conducted; and the inconveniences and hazards that may reasonably be expected have been explained to me by

Contact telephone(s): MAJ Nancy King AV 256-5309 or (508)651-5309

I have been given an opportunity to ask questions concerning this investigational study. Any such questions were answered to my full and complete satisfaction. Should any further questions arise concerning my rights/the rights of the person I represent on study-related injury, I may contact

Office of Chief Counsel

at US Army Natick Research, Development and Engineering Center (508)651-4322

(Name, Address and Phone Number of Hospital (Include Area Code))

I understand that I may at any time during the course of this study revoke my consent and withdraw/have the person I represent withdrawn from the study without further penalty or loss of benefits; however, I/the person I represent may be required (*military volunteer*) or requested (*civilian volunteer*) to undergo certain examination if, in the opinion of the attending physician, such examinations are necessary for my/the person I represent's health and well-being. My/the person I represent's refusal to participate will involve no penalty or loss of benefits to which I am/the person I represent is otherwise entitled.

_____

PART A (2) - ASSENT VOLUNTEER AFFIDAVIT (MINOR CHILD)

I, _____, SSN _____ having full

capacity to consent and having attained my _____ birthday, do hereby volunteer for _____

_____ to participate in _____

_____

(Research Study)

_____

under the direction of _____

conducted at _____

(Name of Institution)

(Continue on Reverse)

PART A(2) - ASSENT VOLUNTEER AFFIDAVIT (MINOR CHILD) (Cont'd.)

The implications of my voluntary participation; the nature, duration and purpose of the research study; the methods and means by which it is to be conducted; and the inconveniences and hazards that may reasonably be expected have been explained to me by

_____

I have been given an opportunity to ask questions concerning this investigational study. Any such questions were answered to my full and complete satisfaction. Should any further questions arise concerning my rights I may contact

_____

at _____

(Name, Address, and Phone Number of Hospital (Include Area Code))

I understand that I may at any time during the course of the study revoke my assent and withdraw from the study without further penalty or loss of benefits, however, I may be requested to undergo certain examination if, in the opinion of the attending physician, such examinations are necessary for my health and well-being. My refusal to participate will involve no penalty or loss of benefits to which I am otherwise entitled.

_____

PART B - TO BE COMPLETED BY INVESTIGATOR

INSTRUCTIONS FOR ELEMENTS OF INFORMED CONSENT (Provide a detailed explanation in accordance with Appendix E, AR 40-38 or AR 70-25.)

We are requesting your participation in a 10 day research study to evaluate the effect of an extremely cold environment on energy expenditure. The study will be conducted in conjunction with your routine cold weather military training.

Before deploying, you will be briefed on how to fill out the physical activity diary that will be used during the study. You will be asked to record all your physical activity in this diary every day. Completing this diary will take only 10 minutes of your time.

Your physical activity during this field exercise will be recorded by activity monitors strapped to your wrist. You will be asked to wear an activity monitor during the entire study period. The activity monitor consists of a small battery-powered device so there is no risk of electrical shock. The monitor should not interfere with your normal training duties.

You will be asked to collect a small sample of your first morning urine each day while you are in the field. Once during the study period, you will be asked to collect your urine for 24 hours for a nitrogen balance test. This test will tell us if you are eating enough food to maintain your muscle mass in the cold environment. We will provide the necessary containers for you to use.

We will measure the volume of water in your body and your energy expenditure. We will do this procedure only <u>two</u> times during the study period. You will be asked not to eat or drink

I do ☐ do not ☐ *(check one & initial)* consent to the inclusion of this form in my outpatient medical treatment record.

SIGNATURE OF VOLUNTEER	DATE	SIGNATURE OF LEGAL GUARDIAN *(If volunteer is a minor)*
PERMANENT ADDRESS OF VOLUNTEER	TYPED NAME OF WITNESS	
	SIGNATURE OF WITNESS	DATE

REVERSE OF DA FORM 5303-R, MAY 88

anything (water included) from 2100 hours the night prior to the test. Then, we will give you 1/2 glass of modified water to drink. This water contains a non-radioactive marker which is safe to consume. We will allow 3-4 hours for the modified water you drink to mix with your body water. During this time, you will be asked to stay in the testing area, and not to eat, drink, smoke or 'chew' (gum or tobacco). A saliva sample (1 teaspoon) will be collected for chemical analysis. There are no known risks to this procedure.

Twice during the study period, we will take blood samples (2 tablespoons) from a vein in your arm using a hypodermic-type needle. This blood sample will be analyzed to determine if any changes occur in your nutritional status during the study period. Even though the blood sampling will be done by a skilled technician, you may feel some localized pain and a small bruise may occur. There is a small risk of infection at the puncture site, but we will use sterile technique so that the risk is no greater than that experienced in blood drawing at a hospital.

Participation in this study is on a voluntary basis. If you choose not to take part or if you choose to withdraw from the study, you will not be required to fill out the physical activity diary or provide urine, saliva and blood samples. However, you will not be excused or withdrawn from the field. The decision to remove you from the field would be made by the local commander.

You will receive no direct benefit from participating in this study other than to know that you contributed valuable information to identify the effect of an extremely cold weather on physical activity patterns and energy expenditure.

The information you give, together with the data obtained from you, will be treated in the strictest confidence. However, since you are in the military, complete confidentiality cannot be promised since information bearing on your health may be required to be revealed to appropriate medical or command authorities. Also, information about you may be inspected by the Institutional Review Boards for Human Studies and officials of the US Army Medical Research and Development Command. The data gathered in this study may be published in a scientific journal or meeting, but you will not be individually identified in any presentation of the study results.

Before you sign this document, be sure that you have read it and fully understand it. If you have any questions at any time concerning this study, please ask. A copy of this Agreement Form is provided for you to keep.

SIGNATURE OF VOLUNTEER	DATE SIGNED	SIGNATURE OF LEGAL GUARDIAN (If volunteer is a minor)	
PERMANENT ADDRESS OF VOLUNTEER	TYPED OR PRINTED NAME AND SIGNATURE OF WITNESS		DATE SIGNED

Previous editions of DA FORM 5303-R.

APPENDIX B

Arctic T Ration Menu and Caloric Supplement

Arctic T Ration Menu

Day	Breakfast	Dinner
Day 1	Eggs w/Ham	Hamburger
	Pork Sausage Links	Hamburger Roll
	Oatmeal, Instant, Assorted	Beans w/Bacon Sauce
	Bread/Milk	Fruit Cocktail
	Grape Juice, Instant	Milk
	Coffee/Cocoa	Orange Beverage Powder
		Coffee
		Cheese Spread
		Catsup/Relish/Mustard
Day 2	Omelet w/Sausage and Potatoes	Chili Con Carne
	Creamed Ground Beef	White Rice
	Oatmeal, Instant, Assorted	Corn
	Blueberry Cake	Marble Cake
	Bread/Milk	Bread/Milk
	Grape Juice, Instant	Cherry Beverage Powder
	Coffee/Cocoa	Coffee
		Peanut Butter/Jelly
Day 3	Western Omelet	Beef Pot Roast
	Pork Sausage Links	White Rice
	Peaches	Mixed Vegetables
	Blueberry Cake	Chocolate Cake
	Bread/Milk	Bread/Milk
	Orange Juice, Instant	Grape Beverage Powder
	Coffee/Cocoa	Coffee
		Peanut Butter/Jelly

Day 4	Omelet w/Bacon Pieces	Chicken Breast w/Gravy
	Pork Sausage Links	Glazed Sweet Potatoes
	Peaches	Corn
	Bread/Milk	Pound Cake
	Orange Juice, Instant	Bread/Milk
	Coffee/Cocoa	Lemon Beverage Powder
		Coffee
		Peanut Butter/Jelly
Day 5	Eggs w/Ham	Lasagna
	Pork Sausage Links	Green Beans
	Oatmeal, Instant, Assorted	Fruit Cocktail
	Apple Coffee Cake	Bread/Milk
	Bread/Milk	Grape Beverage Powder
	Grape Juice, Instant	Coffee
	Coffee/Cocoa	Peanut Butter/Jelly
Day 6	Western Omelet	Chicken Cacciatore
	Pork Sausage Links	Potatoes w/Butter Sauce
	Peaches	Green Beans
	Blueberry Cake	Chocolate Pudding
	Bread/Milk	Bread/Milk
	Orange Juice, Instant	Lemon-Lime Bev Powder
	Coffee/Cocoa	Coffee
		Peanut Butter/Jelly
Day 7	Eggs w/Ham	Chili Con Carne
	Pork Sausage Links	White Rice
	Oatmeal, Instant, Assorted	Corn Marble Cake
	Apple Coffee Cake	Bread/Milk
	Bread/Milk	Cherry Beverage Powder
	Grape Juice, Instant	Coffee
	Coffee/Cocoa	Peanut Butter/Jelly

Day 8	Omelet w/Sausage and Potatoes Creamed Ground Beef Oatmeal, Instant, Assorted Blueberry Cake Bread/Milk Grape Juice, Instant Coffee/Cocoa	Barbecue Pork Roll Macaroni & Cheese Peas and Carrots Applesauce Spice Cake Milk Cherry Beverage Powder Coffee
Day 9	Creamed Ground Beef Potatoes w/Bacon Pieces Pears Oatmeal, Instant, Assorted Bread/Milk Grape Juice, Instant Coffee/Cocoa	Lasagna Green Beans Fruit Cocktail Bread/Milk Grape Beverage Powder Coffee Peanut Butter/Jelly
Day 10	Western Omelet Potatoes w/Bacon Pieces Peaches Oatmeal, Instant, Assorted Bread/Milk Orange Juice, Instant Coffee/Cocoa	Beef Pot Roast White Rice Mixed Vegetables Chocolate Cake Bread/Milk Grape Beverage Powder Coffee Peanut Butter/Jelly

Caloric Supplement

Day	Breakfast	Dinner
Daily	Chicken Noodle Soup (Condensed)	Chicken Noodle Soup (Condensed)
	Chicken Noodle Soup (Dehydrated)	Chicken Noodle Soup (Dehydrated)
	Pouch Bread	Pouch Bread
	Chocolate Covered Cookies	Chocolate Covered Cookies
	M&Ms	M&Ms
	Cocoa Beverage Powder	Cocoa Beverage Powder
	Coffee, Instant	Coffee, Instant
	Cream Substitute, Non-Dairy	Cream Substitute, Non-Dairy

APPENDIX C

Environmental Symptoms Questionnaire

ENVIRONMENTAL SYMPTOMS QUESTIONNAIRE

NAME:_____

DATE:_____(Dy/Mo/Yr)

TIME:_____(24 Hour)

Instructions: Circle the number of each item to correspond to HOW YOU HAVE BEEN FEELING DURING THE PAST DAY/NIGHT. PLEASE ANSWER EVERY ITEM. If you did not have the symptom, circle zero (NOT AT ALL).		NOT AT ALL	SLIGHT	SOMEWHAT	MODERATE	QUITE A BIT	EXTREME
1.	I FELT LIGHTHEADED	0	1	2	3	4	5
2.	I HAD A HEADACHE	0	1	2	3	4	5
3.	I FELT SINUS PRESSURE	0	1	2	3	4	5
4.	I FELT DIZZY	0	1	2	3	4	5
5.	I FELT FAINT	0	1	2	3	4	5
6.	MY VISION WAS DIM	0	1	2	3	4	5
7.	MY COORDINATION WAS OFF	0	1	2	3	4	5
8.	I WAS SHORT OF BREATH	0	1	2	3	4	5
9.	IT WAS HARD TO BREATHE	0	1	2	3	4	5
10.	IT HURT TO BREATHE	0	1	2	3	4	5
11.	MY HEART WAS BEATING FAST	0	1	2	3	4	5
12.	MY HEART WAS POUNDING	0	1	2	3	4	5
13.	I HAD A CHEST PAIN	0	1	2	3	4	5
14.	I HAD CHEST PRESSURE	0	1	2	3	4	5
15.	MY HANDS WERE SHAKING OR TREMBLING	0	1	2	3	4	5
16.	I HAD A MUSCLE CRAMP	0	1	2	3	4	5
17.	I HAD STOMACH CRAMPS	0	1	2	3	4	5
18.	MY MUSCLES FELT TIGHT OR STIFF	0	1	2	3	4	5
19.	I FELT WEAK	0	1	2	3	4	5
20.	MY LEGS OR FEET ACHED	0	1	2	3	4	5
21.	MY HANDS, ARMS OR SHOULDERS ACHED	0	1	2	3	4	5
22.	MY BACK ACHED	0	1	2	3	4	5
23.	I HAD A STOMACH ACHE	0	1	2	3	4	5
24.	I FELT SICK TO MY STOMACH (NAUSEOUS)	0	1	2	3	4	5
25.	I HAD GAS PRESSURE	0	1	2	3	4	5
26.	I HAD DIARRHEA	0	1	2	3	4	5
27.	I FELT CONSTIPATED	0	1	2	3	4	5
28.	I HAD TO URINATE MORE THAN USUAL	0	1	2	3	4	5
29.	I HAD TO URINATE LESS THAN USUAL	0	1	2	3	4	5
30.	I FELT WARM	0	1	2	3	4	5
31.	I FELT FEVERISH	0	1	2	3	4	5
32.	MY FEET WERE SWEATY	0	1	2	3	4	5
33.	I WAS SWEATING ALL OVER	0	1	2	3	4	5
34.	MY HANDS WERE COLD	0	1	2	3	4	5
35.	MY FEET WERE COLD	0	1	2	3	4	5
36.	I FELT CHILLY	0	1	2	3	4	5
37.	I WAS SHIVERING	0	1	2	3	4	5
38.	PARTS OF MY BODY FELT NUMB	0	1	2	3	4	5
39.	MY SKIN WAS BURNING OR ITCHY	0	1	2	3	4	5
40.	MY EYES FELT IRRITATED	0	1	2	3	4	5
41.	MY VISION WAS BLURRY	0	1	2	3	4	5
42.	MY EARS FELT BLOCKED UP	0	1	2	3	4	5
43.	MY EARS ACHED	0	1	2	3	4	5
44.	I COULDN'T HEAR WELL	0	1	2	3	4	5
45.	MY EARS WERE RINGING	0	1	2	3	4	5
46.	MY NOSE FELT STUFFED UP	0	1	2	3	4	5
47.	I HAD A RUNNY NOSE	0	1	2	3	4	5
48.	I HAD A NOSE BLEED	0	1	2	3	4	5
49.	MY MOUTH WAS DRY	0	1	2	3	4	5
50.	MY THROAT WAS SORE	0	1	2	3	4	5
51.	I WAS COUGHING	0	1	2	3	4	5
52.	I LOST MY APPETITE	0	1	2	3	4	5
53.	I FELT SICK	0	1	2	3	4	5
54.	I FELT HUNGOVER	0	1	2	3	4	5
55.	I WAS THIRSTY	0	1	2	3	4	5
56.	I FELT TIRED	0	1	2	3	4	5
57.	I FELT SLEEPY	0	1	2	3	4	5
58.	I FELT WIDE AWAKE	0	1	2	3	4	5
59.	MY CONCENTRATION WAS OFF	0	1	2	3	4	5
60.	I WAS MORE FORGETFUL THAN USUAL	0	1	2	3	4	5
61.	I FELT WORRIED OR NERVOUS	0	1	2	3	4	5
62.	I FELT IRRITABLE	0	1	2	3	4	5
63.	I FELT RESTLESS	0	1	2	3	4	5
64.	I WAS BORED	0	1	2	3	4	5
65.	I FELT DEPRESSED	0	1	2	3	4	5
66.	I FELT ALERT	0	1	2	3	4	5
67.	I FELT GOOD	0	1	2	3	4	5
68.	I WAS HUNGRY	0	1	2	3	4	5

NOTES:

NATICK Form 1214a
1 Dec 85

(PLEASE TURN OVER)

US ARMY RESEARCH INSTITUTE OF ENVIRONMENTAL MEDICINE
NATICK, MA 01760-5007

APPENDIX D

Profile of Mood States Questionnaire

NAME _____ DATE _____

Below is a list of words that describe feelings people have. Please read each one carefully. Then fill in ONE space under the answer to the right which best describes HOW YOU HAVE BEEN FEELING DURING THE PAST DAY/NIGHT.

		0 NOT AT ALL	1 A LITTLE	2 MODERATELY	3 QUITE A BIT	4 EXTREMELY
1.	Friendly					
2.	Tense					
3.	Angry					
4.	Worn out					
5.	Unhappy					
6.	Clear-headed					
7.	Lively					
8.	Confused					
9.	Sorry for things done					
10.	Shaky					
11.	Listless					
12.	Peeved					
13.	Considerate					
14.	Sad					
15.	Active					
16.	On edge					
17.	Grouchy					
18.	Blue					
19.	Energetic					
20.	Panicky					
21.	Hopeless					
22.	Relaxed					
23.	Unworthy					
24.	Spiteful					
25.	Sympathetic					
26.	Uneasy					
27.	Restless					
28.	Unable to concentrate					
29.	Fatigued					
30.	Helpful					
31.	Annoyed					
32.	Discouraged					
33.	Resentful					
34.	Nervous					
35.	Lonely					
36.	Miserable					
37.	Muddled					
38.	Cheerful					
39.	Bitter					
40.	Exhausted					
41.	Anxious					
42.	Ready to fight					
43.	Good natured					
44.	Gloomy					
45.	Desperate					
46.	Sluggish					
47.	Rebellious					
48.	Helpless					
49.	Weary					
50.	Bewildered					
51.	Alert					
52.	Deceived					
53.	Furious					
54.	Efficient					
55.	Trusting					
56.	Full of pep					
57.	Bad-tempered					
58.	Worthless					
59.	Forgetful					
60.	Carefree					
61.	Terrified					
62.	Guilty					
63.	Vigorous					
64.	Uncertain about things					
65.	Bushed					

PLEASE MAKE SURE YOU HAVE ANSWERED EVERY ITEM.

APPENDIX E

Diet History Questionnaire

DIET HISTORY AND HABITS QUESTIONNAIRE

THANK YOU for filling this out. It provides valuable information about your health habits, and it will also provide a good estimate of your dietary intake. There are instruction about filling out the diet section in the booklet itself. However, here are a few pointers about how to fill it out, or about items which some people have found confusing.

IN THE FOOD SECTION:

1. WRITE NUMBERS in the boxes to indicate how many times per day, week or month you eat a food.

2. DON'T SKIP items. If you rarely or never eat a food, check "Rarely/Never".

3. BE CAREFUL about which column you put your answer in. It will make a big difference in the calculations if you check "Hamburgers once a day" when you mean "Hamburgers once a week".

4. NOTICE that there are three kinds of cereals. Be careful that you don't triple- count here, and wind up with cereal 15 times a week when you really mean cereal 5 times a week.

5. Keep in mind also for the three kinds of bread, and three kinds of milk.

6. NOTICE that a medium serving of eggs is stated as two eggs. If you normally only have one egg, check "small".

NAME:_____

SUBJECT NUMBER:_____

REVIEWER:_____

U.S. ARMY RESEARCH INSTITUTE OF ENVIRONMENTAL MEDICINE (USARIEM)
MILITARY NUTRITION DIVISION
NATICK, MA 01760-5007

NATICK FORM 782 (One Time)
1 Sep 90

1. _____

8 ___

HEALTH HABITS AND DIET QUESTIONNAIRE

This form asks you a variety of questions about your background, environment, and habits, which may affect or be related to your health. The information you provide will help scientists to understand more about the causes of disease. This questionnaire will take about 12-15 minutes to complete. Please fill in the information requested, or place a check in the appropriate space. If you are not sure about an answer, please estimate.

THIS SPACE FOR OFFICE USE

TODAY'S DATE: Month ___ - Day ___ - Year ___ (11–16)

Please PRINT YOUR NAME (name of study participant)

17 LAST 31 FIRST 40 MIDDLE 48

A 79 80

1-10*

ADDRESS: 11 STREET 34

35 CITY 49 STATE 52 ZIP 61

62 ___ State Code

TELEPHONE: ( ) ___ - ___ (64–73)

B 79 80

1. When were you born? ___/___/___ (Month Day Year) — 11

2. How old are you? ____ years — 18 ___

3. Sex: 1 ___ Male 2 ___ Female — 20 ___

4. Race or ethnic background:
   1 ___ White, not of Hispanic origin
   2 ___ Black, not of Hispanic origin
   3 ___ Hispanic
   4 ___ American Indian/Alaskan native
   5 ___ Asian
   6 ___ Pacific Islander — 21 ___

5. Please circle the highest grade in school you have completed:
   1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17+ — 22 ___

6. How tall are you? ____ feet ____ inches 7. How much do you weigh? ____ pounds — 24

8. Do you smoke cigarettes now? 1 ___ No 2 ___ Yes — 30 ___
   IF YES: On the average, about how many cigarettes a day do you smoke now? ____ cigarettes — 31 ___

9. During the past year, have you taken any vitamins or minerals?
1 ___ No 2 ___ Yes, fairly regularly 3 ___ Yes, *but not regularly* **If Yes,**

What do you take fairly regularly?	# of PILLS per DAY, WEEK, etc.		
Multiple Vitamins			
One-a-day type	_____ pills per _____		34 ___
Stress-tabs type	_____ pills per _____		37 ___
Therapeutic, Theragran type	_____ pills per _____	How many milligrams or IUs per pill?	40 ___
Other Vitamins			
Vitamin A	_____ pills per _____	_____ IU per pill	43 ___
Vitamin C	_____ pills per _____	_____ mg per pill	47 ___
Vitamin E	_____ pills per _____	_____ IU per pill	51 ___
Calcium or dolomite	_____ pills per _____	_____ mg per pill	55 ___

Other (What?) 1 ___ Yeast 2 ___ Selenium 3 ___ Zinc 4 ___ Iron 5 ___ Beta-carotene
6 ___ Cod liver oil 7 ___ Other _____ 59 ___

Please list the brand of multiple vitamin/mineral you usually take: _____

33 ___

C
79 80

10. This section is about your *usual* eating habits. Thinking back over the past year, how often do you usually eat the foods listed on the next page?

First, check (✓) whether your usual *serving size is small, medium or large.* (A small portion is about one-half the medium serving size shown, or less; a large portion is about one-and-a-half times as much, or more.)

Then, put a *NUMBER* in the most appropriate column to indicate *HOW OFTEN*, on the average, you eat the food. You may eat bananas *twice a week* (put a *2 in the "week"* column). *If you never eat* the food, check "Rarely/Never." Please DO NOT SKIP foods. And please BE CAREFUL which column you put your answer in. *It will make a big difference if you say "Hamburger once a day"* when you mean "Hamburger once a week"!

One item says "in season." Indicate how often you eat this just in the 2-3 month time when that food is in season. (Be careful about overestimating here.)
Please look at the *example* below. This person
1) eats a medium serving of cantaloupe once a week, in season.
2) has ½ grapefruit about twice a month
3) has a small serving of sweet potatoes about 3 times a year.
4) has a large hamburger or *cheeseburger or meat loaf about four times a week.*
5) never eats liver.

EXAMPLE:

	Medium Serving	Your Serving Size			How often?				
		S	M	L	Day	Week	Month	Year	Rarely/ Never
Cantaloupe (in season)	¼ medium		✓			1			
Grapefruit	(½)		✓				2		
Sweet potatoes, yams	½ cup	✓						3	
Hamburger, cheeseburger, meat loaf	1 medium			✓		4			
Liver	4 oz								✓

FOR OFFICE USE
Q 9, *mg or* IU: 1 = 50-100 2 = 200-250 3 = 400-500 4 = 1000 5 = 5000 6 = 10,000 7 = 20,000-25,000 8 = 50,000 9 = Unk

On the following two pages, code the four characters for each food as follows.

___	___ ___	___
S-1	No	Da-1
M-2	Times	Wk-2
L-3		Mo-3
NS-9	NS-99	Yr-4
		Nev-5
		NS-9

If respondent places a checkmark in the "How often" columns, *do not impute "01", once.* Instead, code "99", Not Stated. If respondent does not check a portion size, do not impute medium, but code "9".

	Medium Serving	Your Serving Size			How often?					OFFICE USE
					Day	Week	Month	Year	Rarely/ Never	
FRUITS & VEGETABLES		S	M	L						
EXAMPLE – Apples, applesauce, pears	(1) or ½ cup		✓			4				
Apples, applesauce, pears	(1) or ½ cup									11 ___ ___ ___ ___
Cantaloupe (in season)	¼ medium									15 ___ ___ ___ ___
Oranges	1 medium									19 ___ ___ ___ ___
Orange juice or grapefruit juice	6 oz. glass									23 ___ ___ ___ ___
Grapefruit	(½)									27 ___ ___ ___ ___
Other fruit juices, fortified fruit drinks	6 oz. glass									31 ___ ___ ___ ___
Beans such as baked beans, pintos, kidney, limas, or in chili	¾ cup									35 ___ ___ ___ ___
Tomatoes, tomato juice	(1) or 6 oz.									39 ___ ___ ___ ___
Broccoli	½ cup									43 ___ ___ ___ ___
Spinach	½ cup									47 ___ ___ ___ ___
Mustard greens, turnip greens, collards	½ cup									51 ___ ___ ___ ___
Cole slaw, cabbage, sauerkraut	½ cup									55 ___ ___ ___ ___
Carrots, or mixed vegetables containing carrots	½ cup									59 ___ ___ ___ ___
Green salad	1 med. bowl									63 ___ ___ ___ ___
Salad dressing, mayonnaise (including on sandwiches)	2 Tblsp									67 ___ ___ ___ ___
French fries and fried potatoes	¾ cup									71 ___ ___ ___ ___
Sweet potatoes, yams	½ cup									75 ___ ___ ___ ___ D 79 80
Other potatoes, incl. boiled, baked, potato salad, mashed	(1) or ½ cup									11 ___ ___ ___ ___
Rice	¾ cup									15 ___ ___ ___ ___
MEAT, MIXED DISHES, LUNCH ITEMS		S	M	L	Da	Wk	Mo	Yr	Nv	
Hamburgers, cheeseburgers, meat loaf	1 medium									19 ___ ___ ___ ___
Beef—steaks, roasts	4 oz									23 ___ ___ ___ ___
Beef stew or pot pie with carrots, other vegetables	1 cup									27 ___ ___ ___ ___
Liver, including chicken livers	4 oz.									31 ___ ___ ___ ___
Pork, including chops, roasts	2 chops or 4 oz									35 ___ ___ ___ ___
Fried chicken	2 sm. or 1 lg. piece									39 ___ ___ ___ ___
Chicken or turkey, roasted, stewed or broiled	2 sm. or 1 lg. piece									43 ___ ___ ___ ___
Fried fish or fish sandwich	4 oz. or 1 sand									47 ___ ___ ___ ___
Other fish, broiled, baked	4 oz									51 ___ ___ ___ ___
Spaghetti, lasagna, other pasta with tomato sauce	1 cup									55 ___ ___ ___ ___
Hot dogs	2 dogs									59 ___ ___ ___ ___
Ham, lunch meats	2 slices									63 ___ ___ ___ ___
Vegetable soup, vegetable beef, minestrone, tomato soup	1 med. bowl									67 ___ ___ ___ ___
BREADS / SALTY SNACKS / SPREADS		S	M	L	Da	Wk	Mo	Yr	Nv	
White bread (including sandwiches), bagels, etc., crackers	2 slices, 3 cracks									71 ___ ___ ___ ___
Dark bread, including whole wheat, rye, pumpernickel	2 slices									75 ___ ___ ___ ___ E 79 80
Corn bread, corn muffins, corn tortillas	1 med. piece									11 ___ ___ ___ ___
Salty snacks (such as chips, popcorn)	2 handfuls									15 ___ ___ ___ ___
Peanuts, peanut butter	2 Tblsp.									19 ___ ___ ___ ___
Margarine on bread or rolls	2 pats									23 ___ ___ ___ ___
Butter on bread or rolls	2 pats									27 ___ ___ ___ ___
BREAKFAST FOODS		S	M	L	Da	Wk	Mo	Yr	Nv	
High fiber, bran or granola cereals, shredded wheat	1 med. bowl									31 ___ ___ ___ ___
Highly fortified cereals, such as Product 19, Total, or Most	1 med. bowl									35 ___ ___ ___ ___
Other cold cereals, such as Corn Flakes, Rice Krispies	1 med. bowl									39 ___ ___ ___ ___
Cooked cereals	1 med. bowl									43 ___ ___ ___ ___
Eggs (1 egg = small, 2 eggs = medium)										47 ___ ___ ___ ___
Bacon	2 slices									51 ___ ___ ___ ___
Sausage	2 patties or links									55 ___ ___ ___ ___

	Medium Serving	Your Serving Size			How often?					OFFICE USE
SWEETS		S	M	L	Day	Week	Month	Year	Rarely/ Never	
Ice cream	1 scoop									59 ____
Doughnuts, cookies, cakes, pastry	1 pc. or 3 cookies									63 ____
Pies	1 med. slice									67 ____
Chocolate candy	small bar, 1 oz.									71 ____
DAIRY PRODUCTS, BEVERAGES		S	M	L	Da	Wk	Mo	Yr	Nv	
Cheeses and cheese spreads, not including cottage	2 slices or 2 oz.									75 ____ F 79 80
Whole milk and bevs. with whole milk (not incl. on cereal)	8 oz. glass									11 ____
2% milk and bevs. with 2% milk (not incl. on cereal)	8 oz. glass									15 ____
Skim milk, 1% milk or buttermilk (not incl. on cereal)	8 oz. glass									19 ____
Regular soft drinks (not diet)	12 oz. can or bottle									23 ____
Beer	12 oz. can or bottle									27 ____
Wine	1 med. glass									31 ____
Liquor	1 shot									35 ____
Milk or cream in coffee or tea	1 Tblsp.									39 ____
Sugar in coffee or tea, or on cereal	2 teaspn.									43 ____

	1 Seldom/Never	2 Sometimes	3 Often/Always	
11. How often do you eat the skin on chicken?	_____	_____	_____	47 ___
How often do you eat the fat on meat?	_____	_____	_____	48 ___
How often do you add salt to your food?	_____	_____	_____	49 ___
How often do you add pepper to your food?	_____	_____	_____	50 ___

12. Not counting salad or potatoes, about how many servings of vegetables do you eat per day or per week? _____ vegetables per _____ day, week — 51 ___

13. Not counting juices, how many servings of fruits do you usually eat per day or per week? _____ fruits per _____ day, week — 54 ___

G 79 80

THANK YOU VERY MUCH for taking the time to fill out this information.

Reviewed by _____

APPENDIX F

Ration Record

RATION RECORD

NAME:_____ DATA COLLECTOR #:

SUBJECT #:_____ DATE:_____ _____

MEAL: (CIRCLE ONE) BREAKFAST - B DINNER - D

DESCRIPTION	CODE #	PORTION SERVED	PORTION RETURNED	ADDED SALT	REASON NOT EATEN/ FINISHED	RATING CODE

APPENDIX G

Diet Logs

MRE

Name:_____ Group # _____

Subject No._____ Day/Date _____

RATING OF FOOD

Circle the number that best describes how much you Liked or Disliked each food item you ate.
For example: If you Liked the Chicken, Slightly, circle 6.

FOODS EATEN

Circle how much of each item you ate. If you ate an amount that is not listed write it on the line to the right.
For Example: Circle 1/2 if you ate half the Chicken Stew issued.

CODE	FOOD ITEM	AMOUNT EATEN	Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like/Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely	Water Added Y or N
	ENTREES											
11	Pork with Rice in BBQ Sauce	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
12	Corned Beef Hash	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
13	Chicken Stew	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
14	Omelet with Ham	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
15	Spaghetti, Meat & Sauce	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
16	Chicken a la King	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
17	Beef Stew	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
18	Ham Slice	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
19	Meatballs, Rice & Sauce	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
20	Tuna with Noodles	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
21	Chicken & Rice	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
22	Escalloped Potatoes with Ham	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	STARCHES											
23	Potato au Gratin	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
24	Crackers	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	SPREADS											
25	Cheese Spread	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
26	Jelly	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
27	Peanut Butter	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	FRUIT											
28	Apple Sauce	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
29	Fruit Mix	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
30	Peaches	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
31	Strawberries	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
32	Pears	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
	DESSERT											
33	Chocolate Covered Brownie	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
34	Cherry Nut Cake	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
35	Chocolate Covered Cookie Bar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
36	Chocolate Nut Cake	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
37	Maple Nut Cake	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
38	Oatmeal Cookie Bar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	

MRE

FOODS EATEN

Circle how much of each item you ate. If you ate an amount that is not listed write it on the line to the right.
For Example: Circle 1/2 if you ate half the Tootsie Roll issued.

RATING OF FOOD

Circle the number that best describes how much you Liked or Disliked each food item you ate.
For Example: If you Liked the Tootsie Roll Slightly, circle 6

CODE	FOOD ITEM	AMOUNT EATEN	Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like/Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely	Water Added Y or N
	BEVERAGES											
39	Beverage Base Powder	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
40	Cocoa Powder	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
41	Coffee	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
42	Non Dairy Creamer	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
43	Sugar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	CANDIES											
44	Tootsie Roll	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
45	Charms	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
46	M & M	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
47	Caramel	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
48	Gum	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	OTHERS											
49	Tabasco Sauce	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
50	Salt	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	_____	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	_____	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	

WATER CONSUMPTION

1. Write below the number of canteens of water you consumed at different times today for different purposes. For example, write in 1/4 1/2 3/4 1 2 3.

TIME PERIOD	NUMBER OF CANTEENS		
	Drunk as Plain Water	*Drunk as* Beverages eg. coffee, cocoa.	*Mixed with* Food
Morning	_____	_____	_____
Afternoon	_____	_____	_____
Evening	_____	_____	_____

2. What was the main source of this water ? Please check one.

Lake or Stream _____ 'Jerry' Can _____ CHECK ONE ONLY
Water Buffalo _____ Other Sources _____

LLRP

Name:_____ Group # _____

Subject No._____ Day/Date _____

FOODS EATEN

Circle how much of each item you ate. If you ate an amount that is not listed write it on the line to the right.
For Example: Circle 1/2 if you ate half the Chicken Stew issued.

RATING OF FOOD

Circle the number that best describes how much you Liked or Disliked each food item you ate.
For example: If you Liked the Chicken, Slightly, circle 6.

CODE	FOOD ITEM	AMOUNT EATEN	Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like/Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely	Water Added Yes or No
	ENTREES											
101	Chicken Stew	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
102	Beef Stew	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
103	Chicken Noodle/Turkey Tetrazzini	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
104	Chicken a la King	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
105	Chicken and Rice	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
106	Spag/w Meat Sauce	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
107	Chili con Carne	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
108	Lasagna/Beef Stroganoff	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
	STARCHES											
109	Cornflake Bar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
110	Cornflake/Rice Bar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
111	Oatmeal Cookie Bar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
112	Granola Bar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
113	Fig Bar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
114	Chocolate Covered Cookie	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
115	Chocolate Covered Brownie	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
	CANDY											
116	Tootsie Roll	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
117	Caramels	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
118	Chocolate Bar w/Toffee	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
119	Starch Jellies (Chuckles)	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
120	Charms	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
121	M&Ms	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
122	Gum	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	

LLRP

FOODS EATEN

Circle how much of each item you ate. If you ate an amount that is not listed write it on the line to the right.
For Example: Circle 1/2 if you ate half the Tootsie Roll issued.

RATING OF FOOD

Circle the number that best describes how much you Liked or Disliked each food item you ate.
For Example: If you Liked the Tootsie Roll Slightly, circle 6

CODE	FOOD ITEM	AMOUNT EATEN	Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like/Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely	
	BEVERAGES											
123	Apple Cider Drink Mix	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
124	Cocoa	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
125	Orange Beverage	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
126	Lemon Tea	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
127	Beverage Base Powder	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
128	Coffee	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	___
129	Non Dairy Creamer	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
130	Sugar	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	OTHERS											
131	Salt	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	_____	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	
	_____	1/4 1/2 3/4 1 2 3 ___	1	2	3	4	5	6	7	8	9	

WATER CONSUMPTION

1. Write below the number of canteens of water you consumed at different times today for different purposes. For example, write in 1/4 1/2 3/4 1 2 3.

TIME PERIOD	NUMBER OF CANTEENS		
	Drunk as Plain Water	Drunk as Beverages eg. coffee, cocoa.	Mixed with Food
Morning	_____	_____	_____
Afternoon	_____	_____	_____
Evening	_____	_____	_____

2. What was the main source of this water ? Please check one.

Lake or Stream _____ 'Jerry' Can _____ CHECK ONE ONLY
Water Buffalo _____ Other Sources _____

APPENDIX H

T Ration Meal Acceptability

Name: _____ **BREAKFAST ACCEPTABILITY** Date: _____

Subject Number: _____

Please use the following scale to indicate how much you like or dislike each of the items served in your T-Ration Breakfast today. Please fill in the oval below the number that best describes your opinion of each item. For example, if you did not try an item, fill in the oval under "0" or, if you liked it very much, fill in the oval under "8".

DIDN'T TRY	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

	0	1	2	3	4	5	6	7	8	9
Eggs and Ham	○	○	○	○	○	○	○	○	○	○
Omelet with Bacon Pieces	○	○	○	○	○	○	○	○	○	○
Bread Pudding with Ham	○	○	○	○	○	○	○	○	○	○
Omelet with Sausage and Potatoes	○	○	○	○	○	○	○	○	○	○
Creamed Ground Beef	○	○	○	○	○	○	○	○	○	○
Western Omelet	○	○	○	○	○	○	○	○	○	○
Omelet with Bacon and Cheese	○	○	○	○	○	○	○	○	○	○
Pork Sausage Links	○	○	○	○	○	○	○	○	○	○
Ham Slices	○	○	○	○	○	○	○	○	○	○
Corned Beef Hash	○	○	○	○	○	○	○	○	○	○
Potatoes with Bacon Pieces	○	○	○	○	○	○	○	○	○	○
Strawberry Oatmeal	○	○	○	○	○	○	○	○	○	○
Maple and Brown Sugar Oatmeal	○	○	○	○	○	○	○	○	○	○
Apple Cinnamon Oatmeal	○	○	○	○	○	○	○	○	○	○
Cold Cereal (Frosted Flakes, Etc.)	○	○	○	○	○	○	○	○	○	○
Apple Coffee Cake	○	○	○	○	○	○	○	○	○	○
Blueberry Cake	○	○	○	○	○	○	○	○	○	○
Peaches with Syrup	○	○	○	○	○	○	○	○	○	○
Pears with Syrup	○	○	○	○	○	○	○	○	○	○
Fruit Cocktail	○	○	○	○	○	○	○	○	○	○
Fresh Fruit	○	○	○	○	○	○	○	○	○	○
Bread	○	○	○	○	○	○	○	○	○	○
Peanut Butter	○	○	○	○	○	○	○	○	○	○
Jelly	○	○	○	○	○	○	○	○	○	○
Maple Syrup	○	○	○	○	○	○	○	○	○	○
Orange Juice	○	○	○	○	○	○	○	○	○	○
Grape Juice	○	○	○	○	○	○	○	○	○	○
Milk	○	○	○	○	○	○	○	○	○	○
Cocoa	○	○	○	○	○	○	○	○	○	○
Coffee	○	○	○	○	○	○	○	○	○	○
Pouched Bread	○	○	○	○	○	○	○	○	○	○
M&M's	○	○	○	○	○	○	○	○	○	○
Chicken Noodle Soup	○	○	○	○	○	○	○	○	○	○
Oatmeal Cookie Bar	○	○	○	○	○	○	○	○	○	○
Additional Items: _____	○	○	○	○	○	○	○	○	○	○
_____	○	○	○	○	○	○	○	○	○	○
_____	○	○	○	○	○	○	○	○	○	○
_____	○	○	○	○	○	○	○	○	○	○

Name: _____ Date: _____

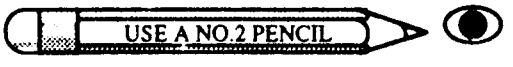
DINNER ACCEPTABILITY Subject Number: _____

Please use the following scale to indicate how much you like or dislike each of the items served in your T-Ration dinner today. Please fill in the oval below the number that best describes your opinion of each item. For example, if you did not try an item, fill in the oval under "0" or, if you liked it very much, fill in the oval under "8".

DIDN'T TRY	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

	0	1	2	3	4	5	6	7	8	9
Chicken Breasts with Gravy	○	○	○	○	○	○	○	○	○	○
Lasagna with Meat Sauce	○	○	○	○	○	○	○	○	○	○
Beef Pot Roast with Gravy	○	○	○	○	○	○	○	○	○	○
Beef Tips with Gravy	○	○	○	○	○	○	○	○	○	○
Chicken Cacciatore	○	○	○	○	○	○	○	○	○	○
Beef Strips and Green Peppers	○	○	○	○	○	○	○	○	○	○
Barbeque Pork	○	○	○	○	○	○	○	○	○	○
Chili	○	○	○	○	○	○	○	○	○	○
Hamburgers	○	○	○	○	○	○	○	○	○	○
Turkey Slices with Gravy	○	○	○	○	○	○	○	○	○	○
Glazed Sweet Potatoes	○	○	○	○	○	○	○	○	○	○
Potatoes with Butter Sauce	○	○	○	○	○	○	○	○	○	○
Rice	○	○	○	○	○	○	○	○	○	○
Macaroni and Cheese	○	○	○	○	○	○	○	○	○	○
Peas with Carrots	○	○	○	○	○	○	○	○	○	○
Green Beans	○	○	○	○	○	○	○	○	○	○
Corn	○	○	○	○	○	○	○	○	○	○
Mixed Vegetables	○	○	○	○	○	○	○	○	○	○
Sliced Carrots	○	○	○	○	○	○	○	○	○	○
Salad	○	○	○	○	○	○	○	○	○	○
Beans with Bacon Sauce	○	○	○	○	○	○	○	○	○	○
Applesauce	○	○	○	○	○	○	○	○	○	○
Peaches with Syrup	○	○	○	○	○	○	○	○	○	○
Pears with Syrup	○	○	○	○	○	○	○	○	○	○
Fruit Cocktail with Syrup	○	○	○	○	○	○	○	○	○	○
Fresh Fruit	○	○	○	○	○	○	○	○	○	○

Proper Mark



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DIDN'T TRY 0	DISLIKE EXTREMELY 1	DISLIKE VERY MUCH 2	DISLIKE MODERATELY 3	DISLIKE SLIGHTLY 4	NEITHER LIKE NOR DISLIKE 5	LIKE SLIGHTLY 6	LIKE MODERATELY 7	LIKE VERY MUCH 8	LIKE EXTREMELY 9
					0	1 2 3 4 5 6 7 8 9			
					Marble Cake				
					Spice Cake				
					Pound Cake				
					Chocolate Cake				
					Blueberry Dessert				
					Chocolate Pudding				
					Bread				
					Hamburger Roll				
					Peanut Butter				
					Jelly				
					Cheese Spread				
					Salad Dressing				
					Catsup				
					Mustard				
					Relish				
					Orange Beverage				
					Grape Beverage				
					Lemon Beverage				
					Lemon-Lime Beverage				
					Cherry Beverage				
					Milk				
					Cocoa				
					Coffee				
					Pouched Bread				
					M&M's				
					Chicken Noodle Soup				
					Oatmeal Cookie Bar				
					Other: _____				
					_____				
					_____				
					_____				

APPENDIX I

Daily Activity Diary

ACTIVITY RECORD

NAME_____

DATE_____

ID NO._____RANK/POSITION_____

CHECK ACTIVITY INTENSITY FOR HOUR PRECEEDING TIME INDICATED

	SLEEPING	VERY LIGHT	LIGHT	MODERATE	HEAVY
0100					
0200					
0300					
0400					
0500					
0600					
0700					
0800					
0900					
1000					
1100					
1200					
1300					
1400					
1500					
1600					
1700					
1800					
1900					
2000					
2100					
2200					
2300					
2400					

SEE REVERSE FOR EXPLANATION OF ACTIVITY LEVELS

BELOW ARE DIFFERENT ACTIVITIES AND THE CORRESPONDING INTENSITY. BASED ON THESE EXAMPLES, USE YOUR OWN BEST GUESS TO ASSIGN AN INTENSITY TO ACTIVITIES NOT LISTED.

WORK INTENSITY MOPP Ø-1	ACTIVITY	WORK INTENSITY MOPP 2-4 OR ARCTIC GEAR
VERY LIGHT	Lying On Ground Standing In Foxhole Sitting In Truck Guard Duty Driving Truck	VERY LIGHT
LIGHT	Cleaning Rifle, Personal Weapons Walking Hard Surface/ 2 mph No Load Walking Hard Surface/ 2 mph 40-60 lb Load	LIGHT
MODERATE	Walking Loose Sand/Snow 2 mph No Load Walking Hard Surface/ 4 mph No Load Calisthenics	MODERATE
HEAVY	Vehicle Maintenance Walking Hard Surface/ 4 mph 40 lb Load *Cleaning Crew Served Weapons* Scouting Patrol Vehicle Repair Setting Up Tents Pick And Shovel Crawling Full Pack Foxhole Digging Field Assaults	HEAVY
HEAVY	Walking Hard Surface/ 4 mph 60 lb Load *Emplacement Digging* Walking Hard Surface/ 5 mph No Load Walking Loose Sand/Snow 3 5 mph No Load	

APPENDIX J

Final Questionnaire

FINAL QUESTIONNAIRE

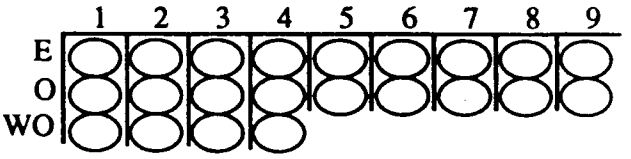
We would like to ask you some questions about the Meal, Ready-to-Eat (MRE) and T-Rations which you ate during your field training exercise. Your opinions will be very important in determining any changes that will be made in the rations. Your answers will be kept confidential. Please answer honestly and thoughtfully. Please use a number two pencil to fill in the ovals. Thank you.

Please indicate your Social Security number. (Last four digits only)

_____

Please indicate your subject number _____

1. What is your rank?



2. How long have you been in the Armed Services? _____YEARS_____MONTHS

3. What is your weight? _____LBS

4. What is your height?
_____FT _____IN

5. What is your sex?
- Male
- Female

6. What is your age? _____

7. Are you currently trying to: lose weight? gain weight? neither?

8. Which ethnic group do you belong to? Please fill in one oval.
- American Indian/Alaskan Native
- Asian/Pacific Islander
- Black/African
- Hispanic
- White/Caucasian, not of Hispanic origin
- Other (please specify):_____

PLEASE USE A #2 PENCIL

9. In what part of the country did you live the longest before age 16? Please fill in one oval.
- New England (ME, NH, VT, MA, CT, RI)
- Middle Atlantic (NJ, NY, PA)
- South Atlantic (DE, MD, VA, WV, NC, SC, GA, FL, DC)
- North Central (OH, IN, IL, MI, WI, MN, IA, MO, ND, SD, NE, KS)
- South Central (KY, TN, AL, MS, AR, LA, OK, TX)
- Mountain (ID, WY, CO, MT, AZ, NM, UT, NV)
- Pacific (WA, OR, CA, AK, HI)
- Other (please specify):_____

10. How would you describe your level of activity, during the training exercise?
- Heavy daily physical activity
- Moderate daily physical activity
- Light daily physical activity
- Mixed acitivity, day to day

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9 S

0 1 2 3 4 5 6 7 8 9 A

DO NOT WRITE IN THIS AREA

H
1 2 3 4 5 6 7 8 9 10 11

W
0 1 2 3 4 5 6 7 8 9

4938

11. Please use the following scale to indicate how much you like or dislike each of the items in the Meal, Ready to Eat by filling in the oval below the number that best describes your opinion of each item. For example, if you did not try an item, fill in the oval under "0" or, if you liked it very much, fill in the oval under "8".

DIDN'T TRY	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

	0	1	2	3	4	5	6	7	8	9
Pork with Rice in BBQ Sauce										
Corned Beef Hash										
Chicken Stew										
Omelet with Ham										
Spaghetti, Meat and Sauce										
Chicken ala King										
Beef Stew										
Ham Slice										
Meatballs, Rice and Sauce										
Tuna with Noodles										
Chicken and Rice										
Escalloped Potatoes with Ham										
Potato au Gratin										
Crackers										
Cheese Spread										
Jelly										
Peanut Butter										
Apple Sauce										
Fruit Mix										
Peaches										
Strawberries										
Pears										
Chocolate Covered Brownie										
Cherry Nut Cake										
Chocolate Covered Cookie Bar										
Chocolate Nut Cake										
Maple Nut Cake										
Oatmeal Cookie Bar										
Beverage Base Powder										
Cocoa Powder										
Coffee										
Cream Substitute										
Sugar										
Tootsie Roll										
Charms										
M & M's										
Caramel										
Gum										
Tabasco Sauce										

12. Do you think that any items should be DROPPED from the MEAL, READY-TO-EAT?

◯ YES ◯ NO

If YES, please list item(s). _____

_____

_____

13. Do you think that any items should be ADDED to the MEAL, READY-TO-EAT?

◯ YES ◯ NO

If YES, please list the item(s). Please be realistic. _____

_____

_____

14. Overall, how acceptable was the MEAL, READY-TO-EAT? Fill in one oval.

EXTREMELY UNACCEPTABLE	VERY	MODERATELY	SLIGHTLY UNACCEPTABLE	NEUTRAL	SLIGHTLY ACCEPTABLE	MODERATELY	VERY	EXTREMELY ACCEPTABLE
◯	◯	◯	◯	◯	◯	◯	◯	◯

15. Please rate how satisfied or dissastisfied you were with each of the following aspects of the MRE you ate. Fill in one oval for each aspect.

EXTREMELY DISSATISFIED	VERY	MODERATELY	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY	VERY	EXTREMELY SATISFIED
1	2	3	4	5	6	7	8	9

	1	2	3	4	5	6	7	8	9
How easy the food is to prepare	◯	◯	◯	◯	◯	◯	◯	◯	◯
How the food tastes	◯	◯	◯	◯	◯	◯	◯	◯	◯
How the food looks	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much food there is in one day's issue	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much variety there is in one day's issue	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much variety there is from day to day	◯	◯	◯	◯	◯	◯	◯	◯	◯

16. What did you think about the amount of VARIETY in the MEAL, READY-TO-EAT? Please fill in the oval under the number which best expresses your opinion.

NEVER TRIED	VARIETY IS FINE AS IS	NEED SOMEWHAT MORE VARIETY	NEED MODERATELY MORE VARIETY	NEED MUCH MORE VARIETY
0	1	2	3	4

	0	1	2	3	4
Entrees (Chicken, Beef, Eggs, Pork)	◯	◯	◯	◯	◯
Starch (Potato, Crackers)	◯	◯	◯	◯	◯
Spreads (Jelly, Peanut Butter, Cheese)	◯	◯	◯	◯	◯
Fruits (Apple, Pears, Peaches, Strawberries)	◯	◯	◯	◯	◯
Desserts (Cakes, Brownie, Cookies)	◯	◯	◯	◯	◯
Hot Beverages (Cocoa, Coffee)	◯	◯	◯	◯	◯
Cold Beverages (Base Powder)	◯	◯	◯	◯	◯
Candies (Tootsie Roll, Charms, M&M's)	◯	◯	◯	◯	◯

17. Please use the following scale to indicate how much you like or dislike each of the items in the T-RATION by filling in the oval below the number that best describes your opinion of each item. For example, if you did not try an item, fill in the oval under "0" or, if you liked it very much, fill in the oval under "8".

DIDN'T TRY	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

	0	1	2	3	4	5	6	7	8	9
Eggs and Ham										
Omelet with Bacon Pieces										
Bread Pudding with Ham										
Omelet with Sausage and Potatoes										
Creamed Ground Beef										
Western Omelet										
Omelet with Bacon and Cheese										
Pork Sausage Links										
Ham Slices										
Corned Beef Hash										
Potatoes with Bacon Pieces										
Strawberry Oatmeal										
Maple and Brown Sugar Oatmeal										
Apple Cinnamon Oatmeal										
Cold Cereal (Frosted Flakes, Etc.)										
Apple Coffee Cake										
Blueberry Cake										
Peaches with Syrup										
Pears with Syrup										
Fruit Cocktail										
Fresh Fruit										
Maple Syrup										
Orange Juice										
Grape Juice										
Chicken Breasts with Gravy										
Lasagna with Meat Sauce										
Beef Pot Roast with Gravy										
Beef Tips with Gravy										
Chicken Cacciatore										
Beef Strips and Green Peppers										
Barbeque Pork										
Chili										
Hamburgers										
Turkey Slices with Gravy										
Glazed Sweet Potatoes										
Potatoes with Butter Sauce										
Rice										
Macaroni and Cheese										

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DIDN'T TRY	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

	0	1	2	3	4	5	6	7	8	9
Peas with Carrots										
Green Beans										
Corn										
Mixed Vegetables										
Sliced Carrots										
Salad										
Beans with Bacon Sauce										
Applesauce										
Peaches with Syrup										
Pears with Syrup										
Fruit Cocktail with Syrup										
Fresh Fruit										
Marble Cake										
Spice Cake										
Pound Cake										
Chocolate Cake										
Blueberry Dessert										
Chocolate Pudding										
Bread										
Hamburger Roll										
Peanut Butter										
Jelly										
Cheese Spread										
Salad Dressing										
Catsup										
Mustard										
Relish										
Orange Beverage										
Grape Beverage										
Lemon Beverage										
Lemon-Lime Beverage										
Cherry Beverage										
Milk										
Cocoa										
Coffee										
Pouched Bread										
M&M's										
Chicken Noodle Soup										
Oatmeal Cookie Bar										
Other: _____										
_____										
_____										
_____										

18. Do you think that any items should be DROPPED from the T-RATION?

◯ YES ◯ NO

If YES, please list item(s). _____

_____

_____

19. Do you think that any items should be ADDED to the T-RATION?

◯ YES ◯ NO

If YES, please list item(s). Please be realistic. _____

_____

_____

20. Overall, how acceptable was the T-RATION? Fill in one oval.

EXTREMELY UNACCEPTABLE	VERY	MODERATELY	SLIGHTLY UNACCEPTABLE	NEUTRAL	SLIGHTLY ACCEPTABLE	MODERATELY	VERY	EXTREMELY ACCEPTABLE
◯	◯	◯	◯	◯	◯	◯	◯	◯

21. Please rate how satisfied or dissastisfied you were with each of the following aspects of the T-RATION you ate. Fill in one oval for each aspect.

EXTREMELY DISSATISFIED	VERY	MODERATELY	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY	VERY	EXTREMELY SATISFIED
1	2	3	4	5	6	7	8	9

	1	2	3	4	5	6	7	8	9
How the food tastes	◯	◯	◯	◯	◯	◯	◯	◯	◯
How the food looks	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much food there is in one day's issue	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much variety there is in one day's issue	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much variety there is from day to day	◯	◯	◯	◯	◯	◯	◯	◯	◯

22. What did you think about the amount of VARIETY in the T-RATION? Please fill in the oval under the number which best expresses your opinion.

NEVER TRIED	VARIETY IS FINE AS IS	NEED SOMEWHAT MORE VARIETY	NEED MODERATELY MORE VARIETY	NEED MUCH MORE VARIETY
0	1	2	3	4

	0	1	2	3	4
Breakfast Entrees (Eggs, Sausage, Ham)	◯	◯	◯	◯	◯
Starch (Potatoes, Oatmeal, Cake)	◯	◯	◯	◯	◯
Fruit (Peaches, Pears)	◯	◯	◯	◯	◯
Juice (Orange, Grape)	◯	◯	◯	◯	◯
Dinner Entrees (Chicken, Beef, Pork, Turkey)	◯	◯	◯	◯	◯
Starch (Potatoes, Rice, Macaroni and Cheese)	◯	◯	◯	◯	◯
Vegetables (Peas, Beans, Corn, Carrots)	◯	◯	◯	◯	◯
Fruit (Applesauce, Fruit Cocktail)	◯	◯	◯	◯	◯
Dessert (Cake, Pudding, Blueberry Dessert)	◯	◯	◯	◯	◯
Bread (Bread, Hamburger Roll)	◯	◯	◯	◯	◯
Spreads (Peanut Butter, Jelly, Cheese)	◯	◯	◯	◯	◯
Hot Beverages (Cocoa, Coffee)	◯	◯	◯	◯	◯
Cold Beverages (Orange, Grape, Lemon, Cherry)	◯	◯	◯	◯	◯

23. On average, how hungry were you after eating each of the following meals? Fill in one oval for each meal.

	NOT AT ALL HUNGRY 1	2	3	4	5	6	7	8	9	EXTREMELY HUNGRY 10
T-Ration Breakfast	○	○	○	○	○	○	○	○	○	○
MRE	○	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○	○

24. How SATISFIED did you FEEL after eating each of the following meals? Fill in one oval for each meal.

	NOT AT ALL SATISFIED 1	2	3	4	MODERATELY SATISFIED 5	6	7	8	EXTREMELY SATISFIED 9
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
MRE	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○

25. For each of the meals, please rate the effect of the following factors on how satisfied you felt after the meal. Please fill in one oval for each factor for each meal.

	DECREASED MY SATISFACTION VERY MUCH 1	2	3	NEITHER DECREASED OR INCREASED MY SATISFACTION 4	5	6	7	8	INCREASED MY SATISFACTION VERY MUCH 9
Amount of Food Available									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
MRE	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
Temperature of the Food									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
MRE	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
The Taste of the Food									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
MRE	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
Having a Break from Work									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
MRE	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
Talking with Friends									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
MRE	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
Ate Because had Nothing Else to Do									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
MRE	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○

26. How often were you HUNGRY during the exercise? Fill in one oval.

NEVER	ALMOST NEVER	SOMETIMES	FAIRLY OFTEN	ALMOST ALWAYS	ALWAYS
○	○	○	○	○	○

27. For what reasons did you NOT eat enough? Fill in all ovals that apply. If you ALWAYS ate enough during this exercise, fill in reason "o" only.

- a. Disliked the food
- b. Not enough food provided
- c. Not enough time to prepare food
- d. Too much trouble to prepare food
- e. Not enough time to eat
- f. Too cold to eat
- g. No heat source to heat the food
- h. Poor heat source to heat the food
- i. Not enough water to prepare the food
- j. Got bored with the food-not enough variety
- k. Food was frozen
- l. Tried to avoid having to go to the bathroom
- m. Did not feel hungry
- n. Other: _____
- o. Always ate enough during this exercise

28. If you chose more than one reason for not eating enough in question #27, please fill in the oval under the letter of the most frequent reason for not eating enough.

a b c d e f g h i j k l m n

29. How often were you THIRSTY during the field exercise? Fill in one oval.

NEVER	ALMOST NEVER	SOMETIMES	FAIRLY OFTEN	ALMOST ALWAYS	ALWAYS
○	○	○	○	○	○

30. For what reasons did you NOT drink enough during the exercise? Fill in the oval next to ALL the reasons that apply. If you ALWAYS drank enough during this exercise, fill in reason "n" only.

- a. Too much trouble to get water
- b. Not enough time/ too much trouble to melt snow or ice
- c. Water source was too far from site
- d. Not enough water available
- e. Not enough equipment to melt snow or ice
- f. Not enough heat sources or stoves to melt snow or ice
- g. Water kept freezing
- h. Not enough beverages (cocoa, coffee, etc) available from rations
- i. Food items were too dry
- j. Water buffalo/water supply was empty
- k. Tried to avoid having to go to the bathroom
- l. Did not feel thirsty
- m. Other: _____
- n. Always drank enough during this exercise

31. If you chose more than one reason for not drinking enough in question #30, please fill in the oval under the letter of the most frequent reason for not drinking enough.

a b c d e f g h i j k l m

32. How did you obtain water? Fill in the oval next to ALL the methods that apply. If you choose more than one method, please mark an "X" next to the most frequent way you obtained water.

- a. Melted snow or ice
- b. From a spring
- c. From a stream
- d. From a lake or pond
- e. 5 gallon cans
- f. Water buffalo
- g. Other:_____

33. How easy or difficult was it for you to obtain water? Fill in one oval.

EXTREMELY EASY	VERY EASY	MODERATELY EASY	SLIGHTLY EASY	NEUTRAL	SLIGHTLY DIFFICULT	MODERATELY DIFFICULT	VERY DIFFICULT	EXTREMELY DIFFICULT
○	○	○	○	○	○	○	○	○

34. How often were you able to get enough water to prepare fruits and beverages? Fill in one oval.

NEVER	ALMOST NEVER	SOMETIMES	FAIRLY OFTEN	ALMOST ALWAYS	ALWAYS
○	○	○	○	○	○

35. How often did you add water to the MEAL, READY-TO-EAT fruits and beverages? Fill in the oval under the number that best expresses your answer next to each food or beverage

DIDN'T TRY	NEVER	ALMOST NEVER	SOMETIMES	FAIRLY OFTEN	ALMOST ALWAYS	ALWAYS
0	1	2	3	4	5	6

	0	1	2	3	4	5	6
Fruits	○	○	○	○	○	○	○
Cocoa	○	○	○	○	○	○	○
Coffee	○	○	○	○	○	○	○
Beverage Base	○	○	○	○	○	○	○

36. What was the typical temperature of foods and beverages you consumed during this exercise? Fill in the oval under the number that best describes the average temperature next to each entree or beverage.

MRE	VERY COLD	COLD	COOL	NEUTRAL	WARM	HOT	VERY HOT
Entrees (Chicken, Beef, Tuna, Pork)	○	○	○	○	○	○	○
Hot/Heated (Cocoa, Coffee)	○	○	○	○	○	○	○
Cold/Unheated (Beverage Base)	○	○	○	○	○	○	○
T-RATION							
Entrees	○	○	○	○	○	○	○
Vegetables	○	○	○	○	○	○	○
Starches	○	○	○	○	○	○	○
Spreads	○	○	○	○	○	○	○
Fruit	○	○	○	○	○	○	○
Dessert	○	○	○	○	○	○	○
Heated Beverages	○	○	○	○	○	○	○
Unheated Beverages	○	○	○	○	○	○	○

37. During this exercise, how did you heat the main dish in the MRE and water for the drinks in the MRE and T-Ration Supplement? Please fill in the oval next to all that apply. If you used more than one heating method, please place an "X" next to the BEST method you used.

- ◯ Did not heat water
- ◯ Canteen cup and heat tabs
- ◯ Canteen cup stand, canteen cup and heat tabs
- ◯ MRE heater pads (Zestotherm)
- ◯ Mounted vehicle heater
- ◯ Heated water on engine block of vehicle
- ◯ Squad stove
- ◯ Yukon stove
- ◯ Optimus ranger stove
- ◯ Sterno
- ◯ Other (please specify):_____

38. How often did you heat the main dish in the MRE? Please fill in the oval next to your answer.

- ◯ Never
- ◯ Once
- ◯ Several times, (please specify number of times:_____)
- ◯ Many times, (please specify number of times:_____)
- ◯ Everyday

39. How often did you heat water for the beverages in the MRE and the T-Ration Supplement? Please fill in the oval next to your answer.

- ◯ Never
- ◯ Once
- ◯ Several times, (please specify number of times:_____)
- ◯ Many times, (please specify number of times:_____)
- ◯ Everyday
- ◯ More than once a day

40. Overall, how easy or difficult was the MEAL, READY-TO-EAT to use? Fill in one oval.

EXTREMELY DIFFICULT	VERY DIFFICULT	MODERATELY DIFFICULT	SLIGHTLY DIFFICULT	NEUTRAL	SLIGHTLY EASY	MODERATELY EASY	VERY EASY	EXTREMELY EASY
◯	◯	◯	◯	◯	◯	◯	◯	◯

41. How often did the following problems occur during the field exercise? Fill in one bubble under the appropriate number for each item.

	NEVER 1	ONCE 2	A FEW TIMES 3	ABOUT EVERY OTHER DAY 4	DAILY 5	MORE THAN ONCE A DAY 6
The food in the MRE froze						
The T-Rations froze before I could eat them						
The water in the canteen froze						
The MRE outer bag was torn or damaged						
The individual food packets were torn or damaged						

42. During this study, did you experience LESS, ABOUT THE SAME or MORE cramps, abdominal discomfort and/or gas than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

CRAMPS, ABDOMINAL DISCOMFORT, AND/OR GAS

43. During this study, did you experience LESS, ABOUT THE SAME or MORE nausea or vomiting than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

NAUSEA OR VOMITING

44. During this study, did you experience LESS, ABOUT THE SAME or MORE diarrhea than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

DIARRHEA

45. During this study, did you experience LESS, ABOUT THE SAME or MORE constipation than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

CONSTIPATION

46. During this study, did you experience LESS, ABOUT THE SAME or MORE heart burn/acid stomach than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

HEART BURN/ ACID STOMACH

47. During this study, was your appetite LESS, ABOUT THE SAME or GREATER than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- GREATER

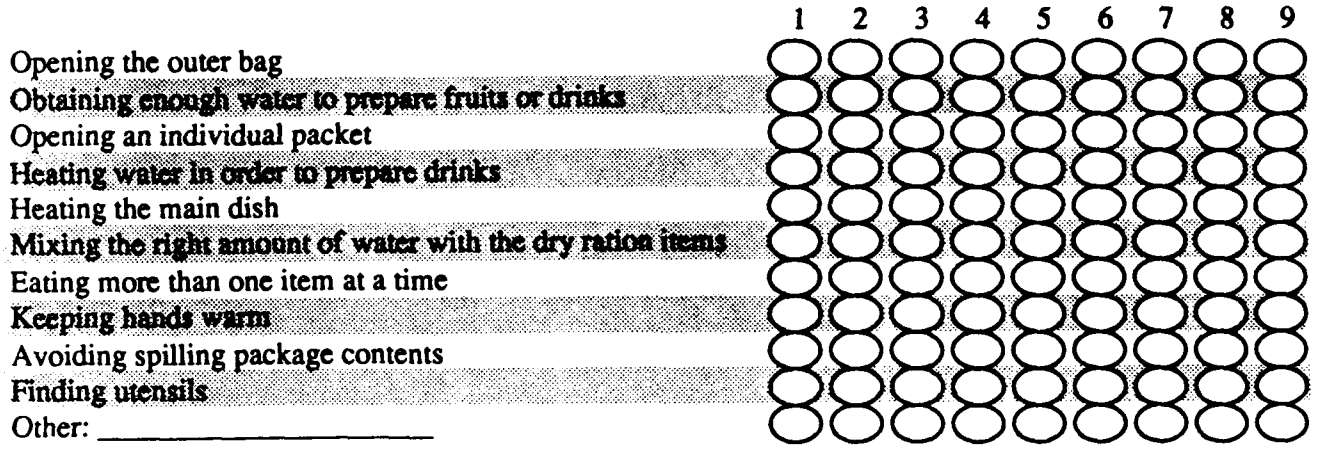
APPETITE

48. Of the symptoms listed below, please indicate how often during an "average" week you experience each one. If you normally don't experience a symptom, please fill in the oval under "0". Please fill in one oval for each symptom.

	TIMES PER WEEK			
	0	1-2	3-4	>5
POOR APPETITE				
CRAMPS, ABDOMINAL DISCOMFORT, GAS				
NAUSEA/VOMITING				
DIARRHEA				
CONSTIPATION				
HEARTBURN, ACID STOMACH				

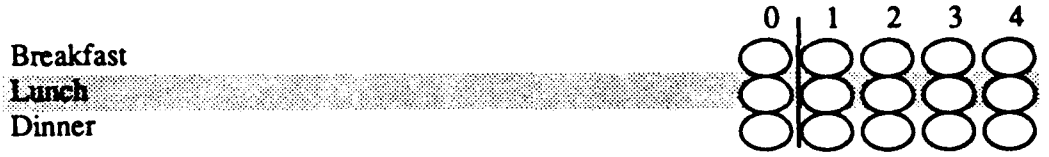
49. Please rate how EASY or DIFFICULT you found each of the following aspects of preparing the MEAL, READY-TO-EAT. Fill in one oval for each.

EXTREMELY EASY	VERY EASY	MODERATELY EASY	SLIGHTLY EASY		SLIGHTLY DIFFICULT	MODERATELY DIFFICULT	VERY DIFFICULT	EXTREMELY DIFFICULT
1	2	3	4	5	6	7	8	9



50. Where did you USUALLY eat each Breakfast, Lunch and Dinner? Please fill in one bubble for each meal.

NOT EATEN	ON THE MOVE	IN THE FIELD (NO SHELTER)	IN A HEATED SHELTER	IN AN UNHEATED SHELTER
0	1	2	3	4



51. Please write additional comments on the rations or on problems associated with cold weather eating/ drinking here.

THANK YOU!!

FINAL QUESTIONNAIRE

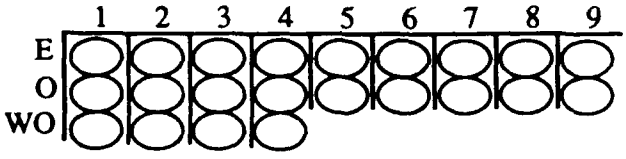
We would like to ask you some questions about the Long Life Ration Packet (LLRP) and T-Rations which you ate during your field training exercise. Your opinions will be very important in determining any changes that will be made in the rations. Your answers will be kept confidential. Please answer honestly and thoughtfully. Please use a number two pencil to fill in the ovals. Thank you.

Please indicate your Social Security number. (Last four digits only)

_____

Please indicate your subject number _____

1. What is your rank?



2. How long have you been in the Armed Services? _____YEARS_____MONTHS

3. What is your weight? _____LBS

4. What is your height?
_____FT _____IN

5. What is your sex?
- Male
- Female

6. What is your age? _____

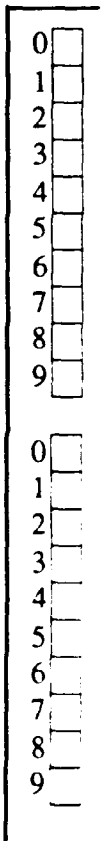
7. Are you currently trying to: ◯ lose weight? ◯ gain weight? ◯ neither?

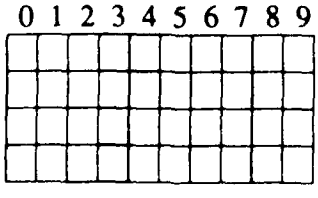
8. Which ethnic group do you belong to? Please fill in one oval.
- American Indian/Alaskan Native
- Asian/Pacific Islander
- Black/African
- Hispanic
- White/Caucasian, not of Hispanic origin
- Other (please specify):_____

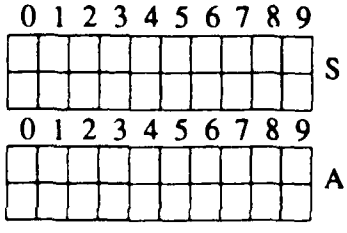
PLEASE USE A #2 PENCIL

9. In what part of the country did you live the longest before age 16? Please fill in one oval.
- New England (ME, NH, VT, MA, CT, RI)
- Middle Atlantic (NJ, NY, PA)
- South Atlantic (DE, MD, VA, WV, NC, SC, GA, FL, DC)
- North Central (OH, IN, IL, MI, WI, MN, IA, MO, ND, SD, NE, KS)
- South Central (KY, TN, AL, MS, AR, LA, OK, TX)
- Mountain (ID, WY, CO, MT, AZ, NM, UT, NV)
- Pacific (WA, OR, CA, AK, HI)
- Other (please specify):_____

10. How would you describe your level of activity, during the training exercise?
- Heavy daily physical activity
- Moderate daily physical activity
- Light daily physical activity
- Mixed acitivity, day to day







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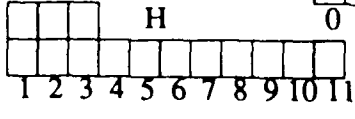

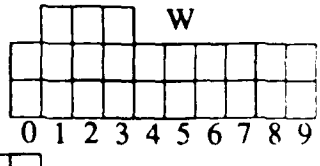

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11. Please use the following scale to indicate how much you like or dislike each of the items in the LONG LIFE RATION PACKET by filling in the oval below the number that best describes your opinion of each item. For example, if you did not try an item, fill in the oval under "0" or, if you liked it very much, fill in the oval under "8".

DIDN'T TRY	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

	0	1	2	3	4	5	6	7	8	9
Beef Stew	○	○	○	○	○	○	○	○	○	○
Beef Stroganoff	○	○	○	○	○	○	○	○	○	○
Chicken Stew	○	○	○	○	○	○	○	○	○	○
Chicken ala King	○	○	○	○	○	○	○	○	○	○
Chicken and Rice	○	○	○	○	○	○	○	○	○	○
Chicken Noodle	○	○	○	○	○	○	○	○	○	○
Chili con Carne	○	○	○	○	○	○	○	○	○	○
Lasagna	○	○	○	○	○	○	○	○	○	○
Spaghetti with Meat Sauce	○	○	○	○	○	○	○	○	○	○
Turkey Tetrazzini	○	○	○	○	○	○	○	○	○	○
Cornflake Bar	○	○	○	○	○	○	○	○	○	○
Cornflake and Rice Bar	○	○	○	○	○	○	○	○	○	○
Oatmeal Cookie Bar	○	○	○	○	○	○	○	○	○	○
Granola Bar	○	○	○	○	○	○	○	○	○	○
Fig Bar	○	○	○	○	○	○	○	○	○	○
Chocolate Covered Cookie	○	○	○	○	○	○	○	○	○	○
Chocolate Covered Brownie	○	○	○	○	○	○	○	○	○	○
Tootsie Roll	○	○	○	○	○	○	○	○	○	○
M&M's	○	○	○	○	○	○	○	○	○	○
Chocolate Bar with Toffee	○	○	○	○	○	○	○	○	○	○
Jelly Candy (Chuckles)	○	○	○	○	○	○	○	○	○	○
Hard Candy (Charms)	○	○	○	○	○	○	○	○	○	○
Caramels	○	○	○	○	○	○	○	○	○	○
Apple Cider Drink Mix	○	○	○	○	○	○	○	○	○	○
Lemon Tea	○	○	○	○	○	○	○	○	○	○
Cocoa	○	○	○	○	○	○	○	○	○	○
Orange Beverage	○	○	○	○	○	○	○	○	○	○
Powdered Beverage Base (MRE)	○	○	○	○	○	○	○	○	○	○
Gum	○	○	○	○	○	○	○	○	○	○
Creamer	○	○	○	○	○	○	○	○	○	○
Sugar	○	○	○	○	○	○	○	○	○	○
Salt	○	○	○	○	○	○	○	○	○	○
Coffee	○	○	○	○	○	○	○	○	○	○
Matches	○	○	○	○	○	○	○	○	○	○
Toilet Paper	○	○	○	○	○	○	○	○	○	○

12. Do you think that any items should be DROPPED from the LONG LIFE RATION PACKET?

◯ YES ◯ NO

If YES, please list item(s). _____

_____

_____

13. Do you think that any items should be ADDED to the LONG LIFE RATION PACKET?

◯ YES ◯ NO

If YES, please list the item(s). Please be realistic. _____

_____

_____

14. Overall, how acceptable was the LONG LIFE RATION PACKET? Fill in one oval.

EXTREMELY UNACCEPTABLE	VERY	MODERATELY	SLIGHTLY UNACCEPTABLE	NEUTRAL	SLIGHTLY ACCEPTABLE	MODERATELY	VERY	EXTREMELY ACCEPTABLE
◯	◯	◯	◯	◯	◯	◯	◯	◯

15. Please rate how satisfied or dissastisfied you were with each of the following aspects of the LLRP you ate. Fill in one oval for each aspect.

EXTREMELY DISSATISFIED	VERY	MODERATELY	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY	VERY	EXTREMELY SATISFIED
1	2	3	4	5	6	7	8	9

	1	2	3	4	5	6	7	8	9
How easy the food is to prepare	◯	◯	◯	◯	◯	◯	◯	◯	◯
How the food tastes	◯	◯	◯	◯	◯	◯	◯	◯	◯
How the food looks	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much food there is in one day's issue	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much variety there is in one day's issue	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much variety there is from day to day	◯	◯	◯	◯	◯	◯	◯	◯	◯

16. What did you think about the amount of VARIETY in the LONG LIFE RATION PACKET? Please fill in the oval under the number which best expresses your opinion.

NEVER TRIED	VARIETY IS FINE AS IS	NEED SOMEWHAT MORE VARIETY	NEED MODERATELY MORE VARIETY	NEED MUCH MORE VARIETY
0	1	2	3	4

	0	1	2	3	4
Entrees (Chicken, Beef, Turkey)	◯	◯	◯	◯	◯
Cereal Bars (Cornflake, Oatmeal, Granola)	◯	◯	◯	◯	◯
Desserts (Cookie, Brownie, Fig Bar)	◯	◯	◯	◯	◯
Candy (Chocolate, M&M's, etc.)	◯	◯	◯	◯	◯
Hot Beverages (Cocoa, Tea, Cider, Coffee)	◯	◯	◯	◯	◯
Cold Beverages (Orange, Base Powder)	◯	◯	◯	◯	◯

17. Please use the following scale to indicate how much you like or dislike each of the items in the T-RATION by filling in the oval below the number that best describes your opinion of each item. For example, if you did not try an item, fill in the oval under "0" or, if you liked it very much, fill in the oval under "8".

DIDN'T TRY	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

	0	1	2	3	4	5	6	7	8	9
Eggs and Ham	○	○	○	○	○	○	○	○	○	○
Omelet with Bacon Pieces	○	○	○	○	○	○	○	○	○	○
Bread Pudding with Ham	○	○	○	○	○	○	○	○	○	○
Omelet with Sausage and Potatoes	○	○	○	○	○	○	○	○	○	○
Creamed Ground Beef	○	○	○	○	○	○	○	○	○	○
Western Omelet	○	○	○	○	○	○	○	○	○	○
Omelet with Bacon and Cheese	○	○	○	○	○	○	○	○	○	○
Pork Sausage Links	○	○	○	○	○	○	○	○	○	○
Ham Slices	○	○	○	○	○	○	○	○	○	○
Corned Beef Hash	○	○	○	○	○	○	○	○	○	○
Potatoes with Bacon Pieces	○	○	○	○	○	○	○	○	○	○
Strawberry Oatmeal	○	○	○	○	○	○	○	○	○	○
Maple and Brown Sugar Oatmeal	○	○	○	○	○	○	○	○	○	○
Apple Cinnamon Oatmeal	○	○	○	○	○	○	○	○	○	○
Cold Cereal (Frosted Flakes, Etc.)	○	○	○	○	○	○	○	○	○	○
Apple Coffee Cake	○	○	○	○	○	○	○	○	○	○
Blueberry Cake	○	○	○	○	○	○	○	○	○	○
Peaches with Syrup	○	○	○	○	○	○	○	○	○	○
Pears with Syrup	○	○	○	○	○	○	○	○	○	○
Fruit Cocktail	○	○	○	○	○	○	○	○	○	○
Fresh Fruit	○	○	○	○	○	○	○	○	○	○
Maple Syrup	○	○	○	○	○	○	○	○	○	○
Orange Juice	○	○	○	○	○	○	○	○	○	○
Grape Juice	○	○	○	○	○	○	○	○	○	○
Chicken Breasts with Gravy	○	○	○	○	○	○	○	○	○	○
Lasagna with Meat Sauce	○	○	○	○	○	○	○	○	○	○
Beef Pot Roast with Gravy	○	○	○	○	○	○	○	○	○	○
Beef Tips with Gravy	○	○	○	○	○	○	○	○	○	○
Chicken Cacciatore	○	○	○	○	○	○	○	○	○	○
Beef Strips and Green Peppers	○	○	○	○	○	○	○	○	○	○
Barbeque Pork	○	○	○	○	○	○	○	○	○	○
Chili	○	○	○	○	○	○	○	○	○	○
Hamburgers	○	○	○	○	○	○	○	○	○	○
Turkey Slices with Gravy	○	○	○	○	○	○	○	○	○	○
Glazed Sweet Potatoes	○	○	○	○	○	○	○	○	○	○
Potatoes with Butter Sauce	○	○	○	○	○	○	○	○	○	○
Rice	○	○	○	○	○	○	○	○	○	○
Macaroni and Cheese	○	○	○	○	○	○	○	○	○	○

(Continued next page)

(Continued)

DIDN'T TRY	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

	0	1	2	3	4	5	6	7	8	9
Peas with Carrots										
Green Beans										
Corn										
Mixed Vegetables										
Sliced Carrots										
Salad										
Beans with Bacon Sauce										
Applesauce										
Peaches with Syrup										
Pears with Syrup										
Fruit Cocktail with Syrup										
Fresh Fruit										
Marble Cake										
Spice Cake										
Pound Cake										
Chocolate Cake										
Blueberry Dessert										
Chocolate Pudding										
Bread										
Hamburger Roll										
Peanut Butter										
Jelly										
Cheese Spread										
Salad Dressing										
Catsup										
Mustard										
Relish										
Orange Beverage										
Grape Beverage										
Lemon Beverage										
Lemon-Lime Beverage										
Cherry Beverage										
Milk										
Cocoa										
Coffee										
Pouched Bread										
M&M's										
Chicken Noodle Soup										
Oatmeal Cookie Bar										
Other: _____										
_____										
_____										
_____										

18. Do you think that any items should be DROPPED from the T-RATION?

◯ YES ◯ NO

If YES, please list item(s)._____

_____

_____

19. Do you think that any items should be ADDED to the T-RATION?

◯ YES ◯ NO

If YES, please list item(s). Please be realistic._____

_____

_____

20. *Overall, how acceptable was the* T-RATION? Fill in one oval.

EXTREMELY UNACCEPTABLE	VERY	MODERATELY	SLIGHTLY UNACCEPTABLE	NEUTRAL	SLIGHTLY ACCEPTABLE	MODERATELY	VERY	EXTREMELY ACCEPTABLE
◯	◯	◯	◯	◯	◯	◯	◯	◯

21. Please rate how satisfied or dissastisfied you were with each of the following aspects of the T-RATION you ate. Fill in one oval for each aspect.

EXTREMELY DISSATISFIED	VERY	MODERATELY	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY	VERY	EXTREMELY SATISFIED
1	2	3	4	5	6	7	8	9

	1	2	3	4	5	6	7	8	9
How the food tastes	◯	◯	◯	◯	◯	◯	◯	◯	◯
How the food looks	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much food there is in one day's issue	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much variety there is in one day's issue	◯	◯	◯	◯	◯	◯	◯	◯	◯
How much variety there is from day to day	◯	◯	◯	◯	◯	◯	◯	◯	◯

22. What did you think about the amount of VARIETY in the T-RATION? Please fill in the oval under the number which best expresses your opinion.

NEVER TRIED	VARIETY IS FINE AS IS	NEED SOMEWHAT MORE VARIETY	NEED MODERATELY MORE VARIETY	NEED MUCH MORE VARIETY
0	1	2	3	4

	0	1	2	3	4
Breakfast Entrees (Eggs, Sausage, Ham)	◯	◯	◯	◯	◯
Starch (Potatoes, Oatmeal, Cake)	◯	◯	◯	◯	◯
Fruit (Peaches, Pears)	◯	◯	◯	◯	◯
Juice (Orange, Grape)	◯	◯	◯	◯	◯
Dinner Entrees (Chicken, Beef, Pork, Turkey)	◯	◯	◯	◯	◯
Starch (Potatoes, Rice, Macaroni and Cheese)	◯	◯	◯	◯	◯
Vegetables (Peas, Pea[illegible] Corn, Carrots)	◯	◯	◯	◯	◯
Fruit (Applesauce, [illegible] Cocktail)	◯	◯	◯	◯	◯
Dessert (Cake, Pudding, Blueberry Dessert)	◯	◯	◯	◯	◯
Bread (Bread, Hamburger Roll)	◯	◯	◯	◯	◯
Spreads (Peanut Butter, Jelly, Cheese)	◯	◯	◯	◯	◯
Hot Beverages (Cocoa, Coffee)	◯	◯	◯	◯	◯
Cold Beverages (Orange, Grape, Lemon, Cherry)	◯	◯	◯	◯	◯

23. On average, how hungry were you after eating each of the following meals? Fill in one oval for each meal.

	NOT AT ALL HUNGRY 1	2	3	4	5	6	7	8	9	EXTREMELY HUNGRY 10
T-Ration Breakfast	○	○	○	○	○	○	○	○	○	○
LLRP	○	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○	○

24. How SATISFIED did you FEEL after eating each of the following meals? Fill in one oval for each meal.

	NOT AT ALL SATISFIED 1	2	3	MODERATELY SATISFIED 4	5	6	7	EXTREMELY SATISFIED 8	9
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
LLRP	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○

25. For each of the meals, please rate the effect of the following factors on how satisfied you felt after the meal. Please fill in one oval for each factor for each meal.

	DECREASED MY SATISFACTION VERY MUCH 1	2	3	NEITHER DECREASED OR INCREASED MY SATISFACTION 4	5	6	7	INCREASED MY SATISFACTION VERY MUCH 8	9
Amount of Food Available									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
LLRP	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
Temperature of the Food									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
LLRP	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
The Taste of the Food									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
LLRP	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
Having a Break from Work									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
LLRP	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
Talking with Friends									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
LLRP	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○
Ate Because had Nothing Else to Do									
T-Ration Breakfast	○	○	○	○	○	○	○	○	○
LLRP	○	○	○	○	○	○	○	○	○
T-Ration Dinner	○	○	○	○	○	○	○	○	○

26. How often were you HUNGRY during the exercise? Fill in one oval.

NEVER	ALMOST NEVER	SOMETIMES	FAIRLY OFTEN	ALMOST ALWAYS	ALWAYS
○	○	○	○	○	○

27. For what reasons did you NOT eat enough? Fill in all ovals that apply. If you ALWAYS ate enough during this exercise, fill in reason "o" only.

- ◯ a. Disliked the food
- ◯ b. Not enough food provided
- ◯ c. Not enough time to prepare food
- ◯ d. Too much trouble to prepare food
- ◯ e. Not enough time to eat
- ◯ f. Too cold to eat
- ◯ g. No heat source to heat the food
- ◯ h. Poor heat source to heat the food
- ◯ i. Not enough water to prepare the food
- ◯ j. Got bored with the food-not enough variety
- ◯ k. Food was frozen
- ◯ l. Tried to avoid having to go to the bathroom
- ◯ m. Did not feel hungry
- ◯ n. Other: _____
- ◯ o. Always ate enough during this exercise

28. If you chose more than one reason for not eating enough in question #27, please fill in the oval under the letter of the most frequent reason for not eating enough.

a	b	c	d	e	f	g	h	i	j	k	l	m	n
◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

29. How often were you THIRSTY during the field exercise? Fill in one oval.

NEVER	ALMOST NEVER	SOMETIMES	FAIRLY OFTEN	ALMOST ALWAYS	ALWAYS
◯	◯	◯	◯	◯	◯

30. For what reasons did you NOT drink enough during the exercise? Fill in the oval next to ALL the reasons that apply. If you ALWAYS drank enough during this exercise, fill in reason "n" only.

- ◯ a. Too much trouble to get water
- ◯ b. Not enough time/ too much trouble to melt snow or ice
- ◯ c. Water source was too far from site
- ◯ d. Not enough water available
- ◯ e. Not enough equipment to melt snow or ice
- ◯ f. Not enough heat sources or stoves to melt snow or ice
- ◯ g. Water kept freezing
- ◯ h. Not enough beverages (cocoa, cider, etc) available from rations
- ◯ i. Food items were too dry
- ◯ j. Water buffalo/water supply was empty
- ◯ k. Tried to avoid having to go to the bathroom
- ◯ l. Did not feel thirsty
- ◯ m. Other: _____
- ◯ n. Always drank enough during this exercise

31. If you chose more than one reason for not drinking enough in question #30, please fill in the oval under the letter of the most frequent reason for not drinking enough.

a	b	c	d	e	f	g	h	i	j	k	l	m
◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

32. How did you obtain water? Fill in the oval next to ALL the methods that apply. If you choose more than one method, please mark an "X" next to the most frequent way you obtained water.

- ○ a. Melted snow or ice
- ○ b. From a spring
- ○ c. From a stream
- ○ d. From a lake or pond
- ○ e. 5 gallon cans
- ○ f. Water buffalo
- ○ g. Other:_____

33. How easy or difficult was it for you to obtain water? Fill in one oval.

EXTREMELY EASY	VERY EASY	MODERATELY EASY	SLIGHTLY EASY	NEUTRAL	SLIGHTLY DIFFICULT	MODERATELY DIFFICULT	VERY DIFFICULT	EXTREMELY DIFFICULT
○	○	○	○	○	○	○	○	○

34. How often were you able to get enough water to prepare foods and beverages? Fill in one oval.

NEVER	ALMOST NEVER	SOMETIMES	FAIRLY OFTEN	ALMOST ALWAYS	ALWAYS
○	○	○	○	○	○

35. How often did you add water to the LONG LIFE RATION PACKET foods and beverages? Fill in the oval under the number that best expresses your answer next to each food or beverage

DIDN'T TRY	NEVER	ALMOST NEVER	SOMETIMES	FAIRLY OFTEN	ALMOST ALWAYS	ALWAYS
0	1	2	3	4	5	6

	0	1	2	3	4	5	6
Entrees (chicken, beef, turkey)	○	○	○	○	○	○	○
Apple Cider Drink Mix	○	○	○	○	○	○	○
Cocoa	○	○	○	○	○	○	○
Coffee	○	○	○	○	○	○	○
Lemon Tea	○	○	○	○	○	○	○
Orange beverage	○	○	○	○	○	○	○
Beverage Base	○	○	○	○	○	○	○

36. What was the typical temperature of foods and beverages you consumed during this exercise? Fill in the oval under the number that best describes the average temperature next to each entree or beverage.

	VERY COLD	COLD	COOL	NEUTRAL	WARM	HOT	VERY HOT
LLRP							
Entrees (Chicken, beef, turkey)	○	○	○	○	○	○	○
Hot/Heated (Cocoa, coffee, tea, cider)	○	○	○	○	○	○	○
Cold/Unheated (Orange, beverage base)	○	○	○	○	○	○	○
T-RATION							
Entrees	○	○	○	○	○	○	○
Vegetables	○	○	○	○	○	○	○
Starches	○	○	○	○	○	○	○
Spreads	○	○	○	○	○	○	○
Fruit	○	○	○	○	○	○	○
Dessert	○	○	○	○	○	○	○
Heated Beverages	○	○	○	○	○	○	○
Unheated Beverages	○	○	○	○	○	○	○

37. During this exercise, how did you heat water for the LLRP main dish and drinks in the LLRP and T-Ration Supllement? Please fill in the oval next to all that apply. If you used more than one heating method, please place an "X" next to the BEST method you used.

- ◯ Did not heat water
- ◯ Canteen cup and heat tabs
- ◯ Canteen cup stand, canteen cup and heat tabs
- ◯ MRE heater pads (Zestotherm)
- ◯ Mounted vehicle heater
- ◯ Heated water on engine block of vehicle
- ◯ Squad stove
- ◯ Yukon stove
- ◯ Optimus ranger stove
- ◯ Sterno
- ◯ Other (please specify):_____

38. How often did you heat water for the main dish in the LLRP? Please fill in the oval next to your answer.

- ◯ Never
- ◯ Once
- ◯ Several times, (please specify number of times:_____)
- ◯ Many times, (please specify number of times:_____)
- ◯ Everyday

39. How often did you heat water for the beverages in the LLRP and the T-Ration Supplement? Please fill in the oval next to your answer.

- ◯ Never
- ◯ Once
- ◯ Several times, (please specify number of times:_____)
- ◯ Many times, (please specify number of times:_____)
- ◯ Everyday
- ◯ More than once a day

40. Overall, how easy or difficult was the Long Life Ration Packet to use? Fill in one oval.

EXTREMELY DIFFICULT	VERY DIFFICULT	MODERATELY DIFFICULT	SLIGHTLY DIFFICULT	NEUTRAL	SLIGHTLY EASY	MODERATELY EASY	VERY EASY	EXTREMELY EASY
◯	◯	◯	◯	◯	◯	◯	◯	◯

41. How often did the following problems occur during the field exercise? Fill in one bubble under the appropriate number for each item.

	NEVER	ONCE	A FEW TIMES	ABOUT EVERY OTHER DAY	DAILY	MORE THAN ONCE A DAY
	1	2	3	4	5	6
The food in the LLRP froze						
The T-Rations froze before I could eat them						
The water in the canteen froze						
The LLRP outer bag was torn or damaged						
The individual food packets were torn or damaged						

42. During this study, did you experience LESS, ABOUT THE SAME or MORE cramps, abdominal discomfort and/or gas than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

CRAMPS, ABDOMINAL DISCOMFORT, AND/OR GAS

43. During this study, did you experience LESS, ABOUT THE SAME or MORE nausea or vomiting than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

NAUSEA OR VOMITING

44. During this study, did you experience LESS, ABOUT THE SAME or MORE diarrhea than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

DIARRHEA

45. During this study, did you experience LESS, ABOUT THE SAME or MORE constipation than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

CONSTIPATION

46. During this study, did you experience LESS, ABOUT THE SAME or MORE heart burn/acid stomach than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- MORE

HEART BURN/ ACID STOMACH

47. During this study, was your appetite LESS, ABOUT THE SAME or GREATER than is usual for you? Please fill in one oval.

- LESS
- ABOUT THE SAME
- GREATER

APPETITE

48. Of the symptoms listed below, please indicate how often during an "average" week you experience each one. If you normally don't experience a symptom, please fill in the oval under "0". Please fill in one oval for each symptom.

	TIMES PER WEEK			
	0	1-2	3-4	>5
POOR APPETITE				
CRAMPS, ABDOMINAL DISCOMFORT, GAS				
NAUSEA/VOMITING				
DIARRHEA				
CONSTIPATION				
HEARTBURN, ACID STOMACH				

49. Please rate how EASY or DIFFICULT you found each of the following aspects of preparing the LONG LIFE RATION PACKET. Fill in one oval for each.

EXTREMELY EASY	VERY EASY	MODERATELY EASY	SLIGHTLY EASY	NEUTRAL	SLIGHTLY DIFFICULT	MODERATELY DIFFICULT	VERY DIFFICULT	EXTREMELY DIFFICULT
1	2	3	4	5	6	7	8	9

	1	2	3	4	5	6	7	8	9
Opening the outer bag	○	○	○	○	○	○	○	○	○
Obtaining enough water to prepare foods or drinks	○	○	○	○	○	○	○	○	○
Opening an individual packet	○	○	○	○	○	○	○	○	○
Heating water in order to prepare foods or drinks	○	○	○	○	○	○	○	○	○
Mixing the right amount of water with the dry ration items	○	○	○	○	○	○	○	○	○
Eating more than one item at a time	○	○	○	○	○	○	○	○	○
Keeping hands warm	○	○	○	○	○	○	○	○	○
Crumbling the ration before adding water	○	○	○	○	○	○	○	○	○
Avoiding spilling package contents	○	○	○	○	○	○	○	○	○
Finding utensils	○	○	○	○	○	○	○	○	○
Other: _____	○	○	○	○	○	○	○	○	○

50. Where did you USUALLY eat each Breakfast, Lunch and Dinner? Please fill in one bubble for each meal.

NOT EATEN	ON THE MOVE	IN THE FIELD (NO SHELTER)	IN A HEATED SHELTER	IN AN UNHEATED SHELTER
0	1	2	3	4

	0	1	2	3	4
Breakfast	○	○	○	○	○
Lunch	○	○	○	○	○
Dinner	○	○	○	○	○

51. Please write additional comments on the rations or on problems associated with cold weather eating/ drinking here.

THANK YOU!!

APPENDIX K

Nutrient Composition of Arctic T Ration

RECORD OF NUTRITIVE VALUES RATION 1990 UPDATE

09/22/89

TOTALS BREAKFAST	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
DAY 1	585.48	48.37	38.70	12.34	528	1046	7.79	2382	2585	180	4.05	5.88	288
2	482.59	63.26	57.32	12.14	501	1008	10.77	2885	1774	168	4.60	10.08	408
3	556.62	55.81	28.93	10.82	514	942	9.98	2280	1844	133	3.64	5.61	204
4	511.89	49.67	68.74	10.58	461	833	7.16	2320	1708	112	3.97	4.71	300
5	580.34	59.90	45.30	13.31	562	1123	9.73	2791	2658	180	4.85	10.53	290
6	542.08	50.70	65.13	11.67	510	865	8.71	2630	1803	122	4.37	3.10	303
7	531.26	63.50	42.46	11.42	492	985	8.28	2502	2266	167	4.32	8.39	426
8	598.48	49.28	33.10	11.15	463	899	8.13	2067	2089	178	3.15	8.57	76
9	530.61	54.93	33.59	10.66	481	864	7.04	2206	1775	125	3.92	5.59	327
10	427.80	58.68	61.98	11.91	519	1121	9.97	2324	2155	160	3.70	4.16	316
MEAN	534.72	55.41	47.53	11.60	503	969	8.76	2448	2066	153	4.06	6.66	294
MEAL REQUIREMENTS 1/3 AR 40-25		33.33	53.3		267	267	6.0	1667 2334	625-1825	133		5.0	

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	2680	.598	3680	119	1.52	1.15	10.8	1.05	131	1.78	8.89	205.09	1362	890
2	2590	.033	2650	43	1.32	1.30	8.8	.91	88	2.28	7.08	227.02	1677	842
3	2420	.427	3130	116	1.56	1.31	11.5	1.06	78	1.47	4.80	218.91	1359	869
4	2700	.584	3680	118	1.32	1.11	9.6	.88	70	2.64	4.61	127.20	1326	768
5	2690	.306	3190	116	1.36	1.24	11.0	1.04	100	2.55	6.31	187.98	1399	887
6	2500	.584	3480	118	1.37	1.24	9.8	.90	107	2.48	8.43	181.83	1516	851
7	2590	.463	3360	116	1.57	1.20	8.7	1.09	88	1.46	4.69	170.20	1317	817
8	2110	.010	2130	46	1.32	.99	10.5	.94	83	2.12	3.40	229.12	1412	921
9	2500	.584	3480	118	1.40	1.17	9.8	1.03	111	1.78	7.15	127.75	1033	755
10	2780	.235	3170	113	1.55	1.39	9.0	.86	95	2.48	4.87	183.54	1527	744
MEAN	2556	.382	3195	102	1.43	1.21	9.9	.98	95	2.10	6.02	185.86	1393	834
MEAL REQUIREMENTS 1/3 AR 40-25			1670	20	0.60	0.73	8.0(N.E.)	0.73	133	1.0	3.3	146.7	1200	

PERCENT OF CALORIES FROM: PROTEIN - 16 PERCENT
FAT - 31 PERCENT
CHO - 53 PERCENT

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

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DAY 1 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
WEST OMELET	113.31	16.24	17.62	3.10	77	249	2.39	945	304	24	2.20	1.61	251
POTATO/BACON	107.53	9.51	7.29	2.72	28	165	1.06	688	534	30	1.48	1.57	19
PEACHES	131.03	.74	.17	.40	5	18	.45	10	152	8		.15	
OAT/APPLE/CN	3.78	5.27	2.98	1.07	23	191	1.05	136	500	46	.16	1.20	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
ORANGE JUICE	.22	1.10	.37	.75	18	29	.37	2	380	2			
COCOA REV PD	.56	1.42	3.51	1.00	34	99	.41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	585.48	48.37	38.70	12.34	528	1046	7.79	2382	2585	180	4.05	5.88	288

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
WEST OMELET	570	.034	630		.13	.32	2.4	.14	55	.64	6.75	10.38	265	161
POTATO/BACON				2	.11	.11	3.9	.14	16	.16	.79	30.44	225	158
PEACHES		.329	550	5	.02	.03	1.0	.03	5			32.94	136	165
OAT/APPLE/CN	180	.013	200		.18	.04	.4	.04	11		1.20	46.90	236	60
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
ORANGE JUICE		.222	370	79	.15	.05	.6					19.56	86	22
COCOA REV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	2	.10	11	.83		10.89	113	227
SUM	2680	.598	3680	119	1.52	1.15	10.8	1.05	131	1.78	8.89	205.09	1362	890

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

09/22/89

DAY 2 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
OMLT/SAUSPOT	107.52	19.39	23.50	2.80	55	183	2.59	1038	231	19	2.38	3.21	350
CR GR BEEF	123.67	18.33	12.51	2.28	13	124	2.54	598	260	20	1.31	4.91	39
OAT/STRAWBER	3.61	4.87	2.57	1.15	20	183	.95	142	273	39	.13	.60	
BLUEBRY CAKE	16.92	4.43	8.22	1.17	20	102	1.47	477	95	7	.55	.00	
BREADWHITE	28.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
GRAPE JUICE	1.25	.75	.25	.45	18	23	.75	30	199	13	.02		
COCOA BEV PD	.56	1.42	3.51	1.00	34	99	.41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	482.59	63.26	57.32	12.14	501	1008	10.77	2885	1774	168	4.60	10.08	408

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
OMLT/SAUSPOT	480	.022	520		.10	.31	1.3	.11	21	.32	3.21	7.44	319	161
CR GR BEEF					.02	.16	2.9	.07	10	.98	1.15	7.01	214	164
OAT/STRAWBER	180	.010	200		.17	.04	.3	.03	12		1.32	47.81	234	60
BLUEBRY CAKE					.03	.14	1.3	.01	2		1.25	52.60	302	83
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
GRAPE JUICE				9	.06	.05	.4					47.30	194	50
COCOA BEV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2590	.033	2650	43	1.32	1.30	8.8	.91	88	2.28	7.08	227.02	1677	842

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DAY 3 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
BRDPDG/M/HAM	107.34	13.66	7.70	2.05	67	192	2.70	624	270	23	1.51	1.64	128
MAPLE SYRUP	6.72	.00	.00	20	13	4	1.15	19	1				
HAM SLICES	56.43	21.35	5.16	2.11	4	175	1.35	738	224	21	1.50	2.49	58
FRUIT COCKTL	133.93	.65	.12	38	10	18	48	10	147	8		.13	
APL COFFE CK	22.36	3.56	5.31	1.03	25	131	1.45	286	106	9	.41	.00	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
ORANGE JUICE	.22	1.10	.37	.75	18	29	37	2	380	2			
COCOA REV PD	.56	1.42	3.51	1.00	34	99	41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	12	2	5	07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	11	113	349	32		.88	18
SUM	556.62	55.81	28.93	10.82	514	942	9.98	2280	1844	133	3.64	5.61	204

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
BRDPDG/M/HAM	490		490		.21	.31	3.4	.10	25	.33	2.62	33.05	256	164
MAPLE SYRUP						.00	0	.00	0			21.08	84	28
HAM SLICES					.17	.17	3.2	17	7	.17	.25	.00	132	83
FRUIT COCKTL		.205	340	3	.03	.03	.6	.08				31.50	130	167
APL COFFE CK					.06	.15	1.1	.02	2		1.78	48.84	257	81
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
ORANGE JUICE		.222	370	79	.15	05	.6					19.56	86	22
COCOA REV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2420	.427	3130	116	1.56	1.31	11.5	1.06	78	1.47	4.80	218.91	1359	869

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DAY 4 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
OMELET/BACON	100.04	19.65	29.45	3.18	48	320	2.31	1112	304	21	2.35	3.21	247
BRKF SAUS DR	50.98	12.69	28.49	1.95	13	74	1.56	596	157	11	1.41		34
PEACHES	131.03	.74	.17	.40	5	18	.45	10	152	8		.15	
BREADWHITE	28.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
ORANGE JUICE	.22	1.10	.37	.75	18	29	.37	2	380	2			
COCOA BEV PD	.56	1.42	3.51	1.00	34	99	.41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	511.89	49.67	68.74	10.58	461	833	7.16	2320	1708	112	3.97	4.71	300

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
OMELET/BACON	770	.034	830		.11	.34	3.5	.13	19	.80	4.18	8.34	377	161
BRKF SAUS DR					.11	.11	1.9	.03	2	.86	.29	1.49	313	96
PEACHES		.329	550	5	.02	.03	1.0	.03	5			32.94	136	165
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
ORANGE JUICE		.222	370	79	.15	.05	.6					19.56	86	22
COCOA BEV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2700	.584	3680	118	1.32	1.11	9.6	.88	70	2.64	4.61	127.20	1326	768

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DAY 5 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
OMEL/RCN CHZ	101.48	19.76	26.72	3.53	120	341	2.33	1144	288	22	2.20	3.21	252
BEEF HASH	112.68	17.70	4.69	3.40	9	162	3.18	923	599	32	2.21	4.63	20
PEARS	132.80	.33	.21	.25	8	12	.36	8	107	7		.13	
OAT/MAPLE/RS	3.54	5.51	3.04	1.08	29	187	1.01	113	569	47	.22	1.20	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
ORANGE JUICE	.22	1.10	.37	.75	18	29	.37	2	380	2			
COCOA REV PD	.56	1.42	3.51	1.00	34	99	.41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	11	113	349	32		.88	18
SUM	580.34	59.90	45.30	13.31	562	1123	9.73	2791	2658	180	4.85	10.53	290

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
OMEL/RCN CHZ	580	.032	630		.06	.37	2.7	.11	19	.80	3.53	9.16	356	161
BEEF HASH		.039	60	2	.00	.15	4.3	19	19	.77	1.54	15.88	177	154
PEARS				2	.02	.03	4	.02	2			31.68	130	165
OAT/MAPLE/RS	180	.014	200		.19	.05	.4	.04	16		1.08	46.83	237	60
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
ORANGE JUICE		.222	370	79	.15	.05	.6					19.56	86	22
COCOA REV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2690	.306	3190	116	1.36	1.24	11.0	1.04	100	2.55	6.31	187.98	1399	887

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DAY 6 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
WEST OMELET	113.31	16.24	17.62	3.10	77	249	2.39	945	304	24	2.20	1.61	251
BRKF SAUS DR	50.98	12.69	28.49	1.95	13	74	1.56	596	157	11	1.41		34
PEACHES	131.03	.74	.17	.40	5	18	.45	10	152	8		.15	
BLUEBRY CAKE	18.92	4.43	8.22	1.17	20	102	1.47	477	95	7	.55	.00	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
ORANGE JUICE	.22	1.10	.37	.75	18	29	.37	2	380	2			
COCOA BEV PD	.56	1.42	3.51	1.00	34	99	.41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	542.08	50.70	65.13	11.67	510	865	8.71	2630	1803	122	4.37	3.10	303

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
WEST OMELET	570	.034	630		.13	.32	2.4	.14	55	.64	6.75	10.38	265	161
BRKF SAUS DR					.11	.11	1.9	.03	2	.86	.29	1.49	313	98
PEACHES		.329	550	5	.02	.03	1.0	.03	5			32.94	136	165
BLUEBRY CAKE					.03	.14	1.3	.01	2		1.25	52.60	302	83
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
ORANGE JUICE		.222	370	79	.15	.05	.6					19.56	86	22
COCOA BEV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2500	.584	3480	118	1.37	1.24	9.8	.90	107	2.48	8.43	181.83	1516	851

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DAY 7 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
OMLT/SAUSPOT	107.52	19.39	23.50	2.80	55	183	2.59	1038	231	19	2.38	3.21	350
HAM SLICES	56.43	21.35	5.16	2.11	4	175	1.35	738	224	21	1.50	2.49	58
FRUIT COCKTL	133.93	.65	.12	.38	10	18	.48	10	147	8		.13	
OAT/MAPLE/RS	3.54	5.51	3.04	1.08	29	187	1.01	113	560	47	.22	1.20	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
ORANGE JUICE	.22	1.10	.37	.75	18	29	.37	2	380	2			
COCOA REV PD	.56	1.42	3.51	1.00	34	99	41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	11	113	349	32		.88	18
SUM	531.26	63.50	42.46	11.42	492	985	8.28	2502	2266	167	4.32	8.39	426

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
OMLT/SAUSPOT	480	.022	520		.10	.31	1.3	.11	21	.32	3.21	7.44	319	161
HAM SLICES					.17	.17	3.2	.17	7	.17	.25	.00	132	83
FRUIT COCKTL		.205	340	3	.03	.03	.6	.08				31.50	130	167
OAT/MAPLE/RS	180	.014	200		.19	.05	.4	.04	16		1.08	46.83	237	60
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
ORANGE JUICE		.222	370	79	.15	.05	.6					19.56	86	22
COCOA REV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2590	.463	3360	116	1.57	1.20	8.7	1.09	88	1.46	4.69	170.20	1317	817

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DAY 8 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CR GR BEEF	123.67	18.33	12.51	2.28	13	124	2.54	598	260	20	1.31	4.91	39
POTATO/BACON	107.53	9.51	7.29	2.72	28	165	1.06	688	534	30	1.48	1.57	19
PEARS	132.80	.33	.21	.25	8	12	.36	8	107	7		.13	
OAT/STRAWBER	3.61	4.87	2.57	1.15	20	183	.95	142	273	39	.13	.80	
BREADWHITE	28.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
GRAPE JUICE	1.25	.75	.25	.45	18	23	.75	30	199	13	.02		
COCOA BEV PD	.56	1.42	3.51	1.00	34	99	.41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	598.48	49.28	33.10	11.15	463	899	8.13	2067	2089	178	3.15	8.57	76

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CR GR BEEF					.02	.16	2.9	.07	10	.98	1.15	7.01	214	164
POTATO/BACON				2	.11	.11	3.9	.14	16	.16	.79	30.44	225	158
PEARS				7	.02	.03	.4	.02	2			31.68	130	165
OAT/STRAWBER	180	.010	200		.17	.04	.3	.03	12		1.32	47.81	234	60
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
GRAPE JUICE				9	.06	.05	.4					47.30	194	50
COCOA BEV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2110	.010	2130	46	1.32	.99	10.5	.94	83	2.12	3.40	229.12	1412	921

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

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DAY 9 BREAKF	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
WEST OMELET	113.31	16.24	17.62	3.10	77	249	2.39	945	304	24	2.20	1.61	251
HAM SLICES	56.43	21.35	5.16	2.11	4	175	1.35	738	224	21	1.50	2.49	58
PEACHES	131.03	.74	.17	.40	5	18	.45	10	152	8		.15	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
ORANGE JUICE	.22	1.10	.37	.75	18	29	.37	2	380	2			
COCOA REV PD	.56	1.42	3.51	1.00	34	99	.41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	530.61	54.93	33.59	10.66	481	864	7.04	2296	1775	125	3.92	5.59	327

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
WEST OMELET	570	.034	630		.13	.32	2.4	.14	55	.64	6.75	10.38	265	161
HAM SLICES					.17	.17	3.2	.17	7	.17	.25	.00	132	83
PEACHES		.329	550	5	.02	.03	1.0	.03	5			32.94	136	165
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
ORANGE JUICE		.222	370	79	.15	.05	6					19.56	86	22
COCOA REV PD	1470		1470	24	.66	.06	1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	10	11	.83		10.89	113	227
SUM	2500	.584	3480	118	1.40	1.17	9.8	1.03	111	1.78	7.15	127.75	1033	755

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

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DAY 10 BREAK	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
HAM EGGS	120.84	20.58	14.55	2.81	63	304	3.07	704	297	22	1.51	1.61	263
BRKF SAUS DR	50.98	12.69	28.49	1.95	13	74	1.56	596	157	11	1.41		34
OAT/APPLE/CN	3.78	5.27	2.98	1.07	23	191	1.05	136	500	46	.16	1.20	
APL COFFE CK	22.36	3.56	5.31	1.03	25	131	1.45	286	106	9	.41	.00	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
ORANGE JUICE	.22	1.10	.37	.75	18	29	.37	2	380	2			
COCOA BEV PD	.56	1.42	3.51	1.00	34	99	.41	107	246	17	.21		
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	427.80	58.68	61.98	11.91	519	1121	9.97	2324	2155	160	3.70	4.16	316

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
HAM EGGS	670		670		.11	.45	2.6	.08	35	.64	1.45	1.88	221	161
BRKF SAUS DR					.11	.11	1.9	.03	2	.86	.29	1.49	313	96
OAT/APPLE/CN	180	.013	200		.18	.04	.4	.04	11		1.20	46.90	236	60
APL COFFE CK					.06	.15	1.1	.02	2		1.78	48.84	257	81
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
ORANGE JUICE		.222	370	79	.15	.05	.6					19.56	86	22
COCOA BEV PD	1470		1470	24	.66	.06	.1	.57	2	.15	.15	15.01	97	22
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2780	.235	3170	113	1.55	1.39	9.0	.86	95	2.48	4.87	183.54	1527	744

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TOTALS DINNER		WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
DAY	1	615.53	69.67	54.82	10.57	479	918	6.75	2324	1956	209	3.82	4.96	96
	2	700.73	55.66	34.37	12.13	1154	975	9.34	2166	1527	196	4.02	8.89	66
	3	622.54	80.47	50.00	11.57	469	1055	14.54	2660	1901	217	4.82	10.11	129
	4	715.99	57.29	50.72	10.54	726	980	8.78	2876	1633	153	5.17	3.12	77
	5	621.72	59.50	36.54	10.19	479	738	8.92	2124	1558	164	3.66	9.71	131
	6	689.28	55.93	35.85	10.59	506	694	8.49	2123	1961	212	3.91	5.26	97
	7	607.85	65.46	49.08	11.02	721	1106	11.91	2310	2074	145	3.32	3.86	72
	8	559.92	55.51	53.66	10.24	455	821	10.25	2353	1715	172	5.46	7.02	113
	9	646.37	66.14	66.09	10.14	476	801	8.88	2335	1740	174	4.28	6.06	81
	10	669.75	61.64	37.50	11.25	460	867	11.23	2763	1732	204	4.95	8.63	87
	MEAN	644.97	62.73	46.86	10.82	592	896	9.91	2463	1780	185	4.34	6.76	95
MEAL REQUIREMENTS 1/3 AR 40-25			33.33	53.3		267	267	6.0	1667 2334	625 1825	133		5.0	

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	1310	.960	2910	55	.90	1.05	26.5	.73	105	1.27	8.29	208.64	1607	959
2	1310	1.212	3320	56	.94	1.27	7.6	.50	183	1.51	3.98	184.58	1270	987
3	1390	3.057	6490	53	1.19	1.30	20.6	.56	114	2.05	4.61	208.48	1606	973
4	940	6.218	11300	40	1.06	1.40	13.4	.45	126	2.30	3.57	212.87	1537	1047
5	2000	3.505	7840	53	.82	.94	12.1	.40	131	1.66	3.47	169.27	1244	897
6	2190	.529	3070	53	.77	.97	15.3	.41	173	1.16	2.78	190.04	1307	982
7	3870	.205	4210	62	1.65	1.12	12.5	1.61	62	.83	.72	171.68	1390	905
8	1310	.174	1600	53	1.15	.99	14.6	.39	105	1.85	4.08	221.69	1592	901
9	2000	3.196	7330	53	.91	1.07	20.8	.49	120	1.49	7.41	187.47	1609	976
10	1500	6.134	11720	55	1.17	1.05	15.2	48	107	1.66	4.32	226.88	1492	1007
MEAN	1782	2.519	5979	53	1.05	1.12	15.9	.60	122	1.58	4.32	198.16	1465	964
MEAL REQUIREMENTS 1/3 AR 40-25			1670	20	0.60	0.73	9.0(N.E.)	0.73	133	1.0	3.3	146.7	1200	

PERCENT OF CALORIES FROM: PROTEIN 17 PERCENT
FAT 29 PERCENT
CHO 54 PERCENT

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DAY 1 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHIX BR/GRVY	163.50	38.03	10.57	2.86	40	369	.89	837	599	47	1.66	2.22	78
GL SW POTATO	120.61	3.38	1.78	1.70	58	46	1.27	332	488	51	.73	.00	
CORN WK O	84.56	3.20	.35	1.03	4	57	.52	221	179	17	.50	.00	0
POUND CAKE	12.67	4.55	25.74	.77	25	79	1.59	324	71	6	.67	.82	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
PEANUT BUT	.28	6.30	9.59	.69	9	73	.36	109	144	35	.24	.57	
JELLY	4.85	.13	.02	.03	1	1	.06	7	6	1	.01		
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	615.53	69.67	54.82	10.57	479	918	6.75	2324	1956	209	3.82	4.96	96

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHIX BR/GRVY				2	.04	.20	18.4	.38	27	.44	.89	7.04	275	222
GL SW POTATO		.799	1330		.02	.08	.7	.14	5		1.19	42.52	200	170
CORN WK O		.159	270		.01	.05	1.2	.03	7		.11	19.95	96	109
POUND CAKE					.11	.16	1.5	.02	11		5.41	38.17	403	82
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
PEANUT BUT	850		850	17	.44	.02	2.4	.04	14		.70	4.39	129	21
JELLY		.002	0	0	.00	.00	.0	.00				9.15	37	14
BEVERAGE BSE				26								37.56	150	38
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	1310	.960	2910	55	.90	1.05	26.5	.73	105	1.27	8.29	208.64	1607	959

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DAY 2 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
LASAGNA	237.35	32.97	17.78	6.46	749	568	5.54	1310	657	86	3.18	6.84	48
GREEN BEANS	95.20	1.53	.09	1.08	43	22	.84	236	105	14	.60	.00	
FRUIT COCKTL	133.93	.65	.12	.38	10	18	.48	10	147	8		.13	
BREADWHITE	28.70	8.52	2.40	1.50	63	73	1.88	380	79	17		.46	
PEANUT BUT	.28	6.30	9.59	.69	9	73	.36	109	144	35	.24	.97	
JELLY	4.85	.13	.02	.03	1	1	.06	7	6	1	.01		
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	700.73	55.66	34.37	12.13	1154	975	9.34	2166	1527	196	4.02	8.89	66

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
LASAGNA		.787	1310		.17	.62	2.1	.24	109	.68	3.08	47.44	482	342
GREEN BEANS		.219	360		.02	.06	.2	.02	18		.21	4.68	26	103
FRUIT COCKTL		.205	340	3	.03	.03	.6	.08				31.50	130	167
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
PEANUT BUT	850		850	17	.44	.02	2.4	.04	14		.70	4.39	129	21
JELLY		.002	0	0	.00	.00	.0	.00				9.15	37	14
BEVERAGE BSE				28								37.58	150	38
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	1310	1.212	3320	58	.94	1.27	7.6	.50	183	1.51	3.98	184.58	1270	987

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DAY 3 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
BEEF POT RST	178.80	47.17	11.20	2.63	29	408	7.47	607	835	57	1.52	7.37	71
RICE	106.90	4.56	8.47	2.33	26	77	2.06	1015	95	15	2.19	.00	15
MIX VEGETBL	84.93	2.86	.43	1.05	27	44	.05	177	153	16	.43	.00	
CHOC CAKE	17.73	5.37	13.53	1.35	35	159	1.59	251	199	42	.43	.82	25
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
PEANUT BUT	.28	6.30	9.59	.69	9	77	.36	109	144	35	.24	.57	
JELLY	4.85	.13	.02	.03	1	1	.06	7	6	1	.01		
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	622.54	80.47	50.00	11.57	469	1055	14.54	2660	1901	217	4.82	10.11	129

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
BEEF POT RST					.02	.52	11.5	.29	27	1.23	1.23	5.90	313	246
RICE					.36	.03	2.7	.05	17		.17	47.75	285	170
MIX VEGETBL		3.033	5060		.03	.05	7	.03	8		.30	9.95	55	99
CHOC CAKE	80	.021	120		.07	.14	9	.02	7		2.21	43.91	319	82
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
PEANUT BUT	850		850	17	.44	.02	2.4	.04	14		.70	4.39	129	21
JELLY		.002	0	0	.00	.00	0	.00				9.15	37	14
BEVERAGE BSE				26								37.56	150	38
COFFEE INSTA				8		.00	4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	2	.10	11	.83		10.89	113	227
SUM	1390	3.057	6490	53	1.19	1.30	20.6	.56	114	2.05	4.61	208.48	1608	973

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DAY 4 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
BBQ PORK	95.01	24.62	25.26	3.33	43	270	2.46	618	718	48	1.67		
HAMBURG ROL	27.20	6.80	4.20		108	66	2.38	482	74	16		.50	
MAC/CHEESE	123.65	10.08	10.80	2.72	232	245	1.20	883	72	22	1.80	1.87	25
PEAS/CARROTS	104.49	3.08	.53	1.36	31	51	1.26	451	184	20	1.17	.00	
APPLESAUCE	140.55	.32	.32	.25	7	12	.62	5	108	5		.07	
SPICE CAKE	22.73	4.84	5.26	.89	27	115	.68	322	88	7	.52	.00	33
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	715.99	57.29	50.72	10.54	726	980	8.78	2876	1633	153	5.17	3.12	77

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
BBQ PORK					.36	.39	7.0	.20	56	1.48	1.31	15.70	389	164
HAMBURG ROL					.40	.26	3.2	.02	30			41.80	232	80
MAC/CHEESE	460	.073	580		.08	.20	1.0	.03	17		.50	19.68	216	167
PEAS/CARROTS		6.132	10220		.08	.05	1.0	.04	6		.72	10.23	58	120
APPLESAUCE	20		20	4	.02	.05	.3	.05	1			35.18	145	177
SPICE CAKE		.013	20		.03	.07	.3	.01	4		1.04	40.73	230	74
BEVERAGE BSE				26								37.56	150	38
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	940	6.218	11300	40	1.06	1.40	13.4	.45	126	2.30	3.57	212.87	1537	1047

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DAY 5 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
PEPPER STK V	124.81	29.37	8.06	1.89	10	171	4.09	432	308	30	1.01	6.70	69
POTATO/RTRSC	138.89	3.77	6.61	2.13	52	61	1.13	443	411	27	1.20	.00	10
CARROTS SLIC	100.76	.93	.15	1.05	37	22	.54	311	130	12	.67	1.09	
MARBLE CAKE	23.08	4.91	5.34	.91	27	116	.69	327	89	7	.53	.00	34
BREADWHITE	26.70	6.52	2.40	1.50	63	77	1.88	380	79	17		.46	
PEANUT BUT	.28	6.30	9.59	.69	9	77	.36	109	144	35	.24	.57	
JELLY	4.85	.13	.02	.03	1	1	.06	7	6	1	.01		
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	621.72	59.50	36.54	10.19	479	738	8.92	2124	1558	164	3.66	9.71	131

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
PEPPER STK V					.03	25	4.4	13	49	.84	.67	3.40	204	168
POTATO/RTRSC	690	.161	960	0	.02	03	2.4	07	15		.17	17.76	146	169
CARROTS SLIC		3.329	5550		.02	.02	.3	.02	8		.87	5.78	28	109
MARBLE CAKE		.013	20		.03	08	.3	.02	5		1.06	41.36	233	76
BREADWHITE					.19	16	1.8	.02	30			37.88	199	75
PEANUT BUT	850		850	17	.44	.02	2.4	.04	14		.70	4.39	129	21
JELLY		.002	0	0	.00	.00	0	.00				9.15	37	14
BEVERAGE BSE				26								37.56	150	38
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	37	.2	.10	11	.83		10.89	113	227
SUM	2000	3.505	7840	53	.82	94	12.1	.40	131	1.66	3.47	169.27	1244	897

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

09/22/89

DAY 6 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHIX CACC	125.21	27.10	8.00	1.84	30	109	1.62	618	461	37	1.50	3.34	68
POTATO/BTRSC	138.89	3.77	6.61	2.13	52	61	1.13	443	411	27	1.20	.00	10
GREEN BEANS	89.17	1.43	.09	1.01	40	20	79	221	98	13	.56	.00	
CHOC PUDDING	101.82	3.12	4.78	1.40	31	137	2.48	230	372	47	.40	.00	0
BREADWHITE	20.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
PEANUT BUT	.28	6.30	9.59	.69	9	73	.36	109	144	35	.24	.57	
JELLY	4.85	.13	.02	.03	1	1	.06	7	6	1	.01		
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	689.28	55.93	35.85	10.59	506	694	8.49	2123	1961	212	3.91	5.26	97

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHIX CACC		.162	270		.02	.20	7.7	.17	82	.33	.33	4.81	200	167
POTATO/BTRSC	890	.161	960	0	.02	.03	2.4	.07	15		.17	17.76	146	169
GREEN BEANS		.205	340		.02	06	.2	.02	17		.19	4.38	24	98
CHOC PUDDING	190		190		.00	.12	.3	.00	3		1.39	62.13	304	173
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
PEANUT BUT	850		850	17	.44	.02	2.4	.04	14		.70	4.39	129	21
JELLY		.002	0	0	.00	.00	.0	.00				9.15	37	14
BEVERAGE BSE				26								37.56	150	38
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	480		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2190	.529	3070	53	.77	.97	15.3	.41	173	1.16	2.78	190.04	1307	982

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

09/22/89

DAY 7 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
HAMBURGERS	84.81	31.85	17.64	1.78	16	315	4.80	66	765		1.04		
BAKED BEANS	110.45	11.96	6.41	3.61	130	211	3.39	708	585	76	1.62	1.48	8
HAMBURG ROL	27.20	6.80	4.20		108	66	2.38	482	74	16		.50	
FRUIT COCKTL	133.93	.65	.12	.38	10	18	.48	10	147	8		.13	
CHEESE SPRED	18.20	5.62	15.69	1.79	161	255	18	485	26	9	.66	.86	46
CATSUP	13.72	.40	.08	.72	4	10	16	208	71				
MUSTARD	9.62	.56	.53	.52	10	9	.24	150	16				
RELISH	7.56	.06	.07	.23	2	2	.10	85					
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	607.85	65.46	49.08	11.02	721	1106	11.91	2310	2071	145	3.32	3.86	72

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
HAMBURGERS					.12	.25	6.9					.96	290	137
BAKED BEANS					.10	.12	1.8	.12	15		.51	36.25	251	169
HAMBURG ROL					.40	.26	3.2	.02	30			41.80	232	80
FRUIT COCKTL		.205	340	3	.03	.03	.6	.08				31.50	130	167
CHEESE SPRED	3130		3130	22	.88	.08	0	1.30	5		.21	1.70	170	43
CATSUP	280		280		.02	.01	.3					5.08	23	20
MUSTARD					.00	.00	0					.77	10	12
RELISH					.00	.00	0					4.08	17	12
BEVERAGE BSE				26								37.56	150	38
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	2	.10	11	.83		10.89	113	227
SUM	3870	.205	4210	62	1.65	1.12	12.5	1.61	62	.83	.72	171.68	1390	905

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

09/22/89

DAY 8 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHILI	111.19	22.33	23.13	1.77	46	204	4.51	779	733	44	1.99	5.10	46
RICE	108.90	4.56	8.47	2.33	26	77	2.06	1015	95	15	2.19	.00	15
CORN WK D	84.56	3.20	.35	1.03	4	57	.52	221	179	17	.50	.00	0
MARBLE CAKE	23.08	4.91	5.34	.91	27	116	.69	327	89	7	.53	.00	34
BREADWHITE	28.70	8.52	2.40	1.50	63	73	1.88	380	79	17		.46	
PEANUT BUT	.28	6.30	9.59	.69	9	73	.36	109	144	35	.24	.57	
JELLY	4.85	.13	.02	.03	1	1	.06	7	6	1	.01		
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE, INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	559.92	55.51	53.66	10.24	455	821	10.25	2953	1715	172	5.46	7.02	113

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHILI					.03	.27	5.6	.14	22	1.02	2.04	11.67	344	170
RICE					.36	.03	2.7	.05	17		.17	47.75	285	170
CORN WK D		.159	270		.01	.05	1.2	.03	7		.11	19.95	98	109
MARBLE CAKE		.013	20		.03	.08	.3	.02	5		1.06	41.36	233	78
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
PEANUT BUT	850		850	17	.44	.02	2.4	.04	14		.70	4.39	129	21
JELLY		.002	0	0	.00	.00	.0	.00				9.15	37	14
BEVERAGE BSE				26								37.56	150	38
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	1310	.174	1600	53	1.15	.99	14.6	.39	105	1.85	4.08	221.69	1592	901

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

09/22/89

DAY 9 DINNER	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
TURKEY/GRAVY	117.82	34.00	11.80	1.83	13	243	1.99	731	440	33	1.63	3.32	53
POTATO/RTRSC	138.89	3.77	6.61	2.13	52	61	1.17	443	411	27	1.20	.00	10
MIX VEGETBL	84.93	2.86	.43	1.05	27	44	.95	177	153	16	.43	.00	
BLUEBERY DES	57.88	.44	5.13	.15	7	7	.74	49	46	4	.10	.00	
POUND CAKE	12.67	4.55	25.74	.77	25	79	1.59	324	71	6	.67	.82	
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
PEANUT BUT	.28	6.30	9.59	.69	9	73	.36	109	144	35	.24	.57	
JELLY	4.85	.13	.02	.03	1	1	.06	7	8	1	.01		
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	646.37	66.14	66.09	10.14	476	801	8.88	2335	1740	174	4.28	6.06	81

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
TURKEY/GRAVY					.02	.25	11.3	.20	28	.66	.17	.75	245	166
POTATO/RTRSC	690	.161	960	0	.02	.03	2.4	.07	15		.17	17.76	146	169
MIX VEGETBL		3.033	5060		.03	.05	.7	.03	8		.30	9.95	55	99
BLUEBERY DES					.02	.03	.3	.01	3		.67	19.88	127	83
POUND CAKE					.11	.16	1.5	.02	11		5.41	38.17	403	82
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
PEANUT BUT	850		850	17	.44	.02	2.4	.04	14		.70	4.39	129	21
JELLY		.002	0	0	.00	.00	0	.00				9.15	37	14
BEVERAGE BSE				26								37.56	150	38
COFFEE INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	2000	3.196	7330	53	.91	1.07	20.8	.49	120	1.49	7.41	187.47	1609	976

RECORD OF NUTRITIVE VALUES TRATION FY90 UPDATE

09/22/89

DAY 10 DINNE	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
BEEF TIPS	122.38	30.38	7.35	1.95	20	235	2.97	457	462	34	.94	6.71	54
RICE	106.90	4.58	8.47	2.33	26	77	2.06	1015	95	15	2.19	.00	15
PEAS/CARROTS	104.49	3.08	.53	1.36	31	51	1.26	451	184	20	1.17	.00	
CHOC PUDDING	101.82	3.12	4.78	1.40	31	137	2.48	230	372	47	.40	.00	0
BREADWHITE	26.70	6.52	2.40	1.50	63	73	1.88	380	79	17		.46	
PEANUT BUT	.28	6.30	9.59	.69	9	73	.36	109	144	35	.24	.57	
JELLY	4.85	.13	.02	.03	1	1	.06	7	8	1	.01		
BEVERAGE BSE	.00	.00	.00	.19	0	0	.00	0	0				
COFFEE INSTA	.03	.00	.00	.12	2	5	.07	1	41	4	.00		
MILK LOWFAT	202.33	7.55	4.35	1.68	277	215	.11	113	349	32		.88	18
SUM	669.75	61.64	37.50	11.25	460	867	11.23	2763	1732	204	4.95	8.63	87

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
BEEF TIPS				2	.02	.29	6.4	.23	25	.84	1.34	5.81	211	168
RICE					.38	.03	2.7	.05	17		.17	47.75	285	170
PEAS/CARROTS		6.132	10220		.08	.05	1.0	.04	6		.72	10.23	58	120
CHOC PUDDING	190		190		.00	.12	.3	.00	3		1.39	62.13	304	173
BREADWHITE					.19	.16	1.8	.02	30			37.88	199	75
PEANUT BUT	850		850	17	.44	.02	2.4	.04	14		.70	4.39	129	21
JELLY		.002	0	0	.00	.00	.0	.00				9.15	37	14
BEVERAGE BSE				26								37.56	150	38
COFFEE-INSTA				8		.00	.4	.00				1.10	4	1
MILK LOWFAT	460		460	2	.09	.37	.2	.10	11	.83		10.89	113	227
SUM	1500	6.134	11720	55	1.17	1.05	15.2	.48	107	1.68	4.32	228.88	1492	1007

RECORD OF NUTRITIVE VALUES IRATION FY90 UPDATE W-SUPPLEMENT

03/21/90

CW SUPPLEMEN	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHIX NOOD SP	1 55	8.03	3 04	3.99	35	117	1 19	1210	174	22	4 20	76	
CHIX NDL SPA	45	2 70	4 89	2.11	6	24	54	748	43	3	1 78	18	6
POUCH BREAD	13 99	5 37	7 03	1 03	13	52	49	341	90	13	87	57	2
COOKIES CHCV	79	3 03	12 26	53	29	71	98	94	92	23	18	43	8
M&MS	60	6 67	10 70	84	87	88	52	73	132	28	15	48	
COCOA BEV PD	1 00	2 69	5.62	1 86	66	184	79	200	478	34	40	42	1
COFFEE INSTA	05	28	00	11	2	4	06	0	32	4	00		
CREAM SUB NO	18	.26	1 30	22	6	24	04	17	49	1	03		
SUM	18 62	29.03	44.83	10 69	245	563	4 61	2683	1089	129	7 63	2 83	. 17

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHIX NOOD SP					.26	14	3 9	05	14		.26	21.19	144	38
CHIX NDL SPA					2.62	.04	8	01	8	.02	.70	7.86	86	18
POUCH BREAD					.17	.06	.9	03	9		1.47	29.29	202	57
COOKIES CHCV	520		520	1	.45	.08	3	28	6		.99	26.39	228	43
M&MS					.02	12	3	01	4		1.15	29.17	240	48
COCOA BEV PD	2860		2860	46	1 21	12	2	1.18	3	.29	.38	30.82	185	42
COFFEE INSTA				21			2	00				.80	4	1
CREAM SUB NO						02		00				2 04	21	4
SUM	3380		3380	69	4 73	58	6 5	1 59	44	31	4.96	147 58	1110	251

APPENDIX L

Nutrient Composition of MRE

RECORD OF NUTRITIVE VALUES MRE VIII

03/16/89

TOTALS	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
1	261.76	45.51	46.80	8.51	466	659	6.58	1337	1665	120	3.14	4.75	79
2	173.24	46.08	40.91	7.87	421	593	6.50	1487	1319	122	3.38	7.35	105
3	183.33	45.34	50.89	8.87	483	817	4.64	1354	1854	185	2.85	2.43	43
4	263.19	47.81	64.18	11.57	688	1372	5.70	2550	1421	130	4.97	2:20	406
5	209.68	43.39	55.02	9.18	600	696	6.66	2067	1012	108	4.55	3.17	98
6	174.76	53.34	50.37	9.00	445	715	4.97	1603	1548	170	3.21	2.27	84
7	193.71	57.03	55.90	8.37	413	579	6.92	1773	1219	160	3.89	.90	138
8	211.02	44.13	45.92	10.82	515	1125	5.29	2457	1524	128	5.13	2.88	107
9	149.96	55.96	56.60	9.54	413	644	7.86	1922	1484	172	4.35	7.38	66
10	208.50	51.48	56.11	6.90	548	716	5.27	1538	624	106	3.01	.90	111
11	186.66	49.87	53.42	7.98	559	774	5.46	1861	980	106	3.69	2.85	130
12	290.45	38.09	41.63	8.72	435	757	5.51	1714	1498	127	3.62	2.82	66
MEAN	208.69	48.17	51.48	8.94	499	787	5.95	1805	1346	136	3.82	3.32	119
MEAL REQUIREMENTS 1/3 AR 40-25		33.33	53.3		267	267	6.0	1667-2334	625-1825	133		5.0	

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	2930	.004	2940	91	2.65	1.10	10.5	1.84	47	.86	4.14	194.60	1382	557
2	3070	.014	3100	91	2.38	.96	9.8	1.86	85	1.09	4.03	186.08	1297	454
3	4630	2.007	7980	165	3.22	.98	18.7	1.84	122	1.09	3.92	171.93	1327	460
4	6910	.058	7010	116	3.51	1.32	8.8	3.16	84	.92	5.24	151.66	1375	538
5	2910	.578	3870	69	2.17	1.10	10.5	2.06	61	.79	6.41	138.55	1223	456
6	4630	.234	5020	135	3.21	1.01	16.5	1.77	71	.86	3.55	131.09	1191	419
7	1710	1.267	3820	78	2.03	1.01	12.9	.75	74	1.70	6.74	141.02	1295	456
8	3800	.055	3900	91	3.02	1.15	10.4	2.06	25	.76	4.33	162.07	1238	473
9	2200	.023	2240	152	2.38	.98	16.2	.99	72	1.02	8.80	148.30	1318	418
10	3510	.000	3510	67	2.19	.92	11.9	2.01	55	.56	5.96	129.84	1230	451
11	3400	.059	3500	113	2.47	1.00	17.3	2.44	115	.33	3.55	157.42	1310	455
12	3660	.004	3670	92	3.07	1.06	11.5	2.19	61	.63	3.44	186.29	1272	565
MEAN	3613	.359	4213	105	2.69	1.05	12.9	1.91	73	.88	5.01	158.07	1288	475
MEAL REQUIREMENTS 1/3 AR 40-25			1670	20	0.60	0.73	8.0(N.E.)	0.73	133	1.0	3.3	148.7	1200	

PERCENT OF CALORIES FROM: PROTEIN - 15 PERCENT
FAT - 36 PERCENT
CHO - 49 PERCENT

RECORD OF NUTRITIVE VALUES MRE VIII

03/16/89

MENU 1	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
PORK BBQ/RCE	143.68	32.27	25.13	3.81	39	288	3.67	828	796	48	2.06	4.54	79
APPLESAUCE	100.27	.23	.23	.18	5	9	.44	4	77	4		.05	
JELLY	9.70	.26	.05	.05	2	3	.11	13	11	2	.01		
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
CANDY AVER	.77	2.65	4.79	.49	44	41	.44	74	67	11	.16	.16	
COCOA BEV PD	1.10	2.80	6.95	1.99	67	196	.81	211	487	34	.43		
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
TABASCO SCE	4.80	.10	.00					2	0	0			
SUM	261.78	45.51	46.80	8.51	466	659	6.58	1337	1665	120	3.14	4.75	79

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
PORK BBQ/RCE					.34	.32	6.4	.27	41	.45	2.49	21.91	443	227
APPLESAUCE	10		10	3	.01	.04	.2	.04	1			25.10	103	126
JELLY		.004	10	1	.00	.00	.0	.00				18.29	75	28
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
CANDY AVER					.01	.06	.1	.01	1		.43	28.30	167	37
COCOA BEV PD	2920		2920	48	1.31	.11	.2	1.13	5	.30	.30	29.69	192	43
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
TABASCO SCE							.0					.10	1	5
SUM	2930	.004	2940	91	2.65	1.10	10.5	1.84	47	.86	4.14	194.60	1382	557

RECORD NUTRITIVE VALUES MRE VIII

03/16/89

MENU 2	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
C BEEF HASH	157.56	29.78	13.06	3.06	25	181	3.40	878	445	34	2.15	6.80	86
PEARS DEHY	.42	.18	.04	.15	4	7	.13	9	71	5	.02	.04	
JELLY	9.70	.26	.05	.05	2	3	.11	13	11	2	.01		
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
OATML CK BAR	3.02	5.86	11.15	.63	14	84	.95	172	79	26	.29	.50	19
COCOA BEV PD	1.10	2.80	8.95	1.99	67	196	.81	211	487	34	.43		
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	7[illegible]	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	173.24	46.08	40.91	7.87	421	593	6[illegible].50	1487	1319	122	3.38	7.35	105

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
C BEEF HASH				2	.02	.20	5.2	.32	66	.68	.68	23.34	330	227
PEARS DEHY		.003	10		.01	.02	.1	.01	0		.19	14.22	58	15
JELLY		.004	10	1	.00	.00	.0	.00				18.29	75	28
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
OATML CK BAR	150	.006	160		.06	.05	.6	.02	15		1.95	29.33	241	50
COCOA BEV PD	2920		2920	48	1.31	.11	.2	1.13	5	.30	.30	29.69	192	43
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	3070	.014	3100	91	2.38	.96	9.8	1.86	85	1.09	4.03	186.08	1297	454

RECORD OF NUTRITIVE VALUES MRE VIII

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MENU 3	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHIX STEW	174.30	19.28	10.23	2.72	41	297	1.27	635	671	43	1.29	2.27	43
PEACHES FRDH	.36	.70	.07	.30	3	13	.31	9	113	5	.01	.00	
PEANUT BUT	.55	12.61	19.19	1.38	18	147	.71	218	289	70	.48		
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
CANDY AVER	.77	2.65	4.79	.49	44	41	.44	74	67	11	.16	.16	
COCOA BEV PD	1.10	2.80	6.95	1.99	67	196	.81	211	487	34	.43		
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
TABASCO SCE	4.80	.10	.00					2	0	0			
SUM	183.33	45.34	50.89	8.87	483	817	4.64	1354	1854	185	2.85	2.43	43

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHIX STEW		1.948	3250		.05	.18	9.5	.23	86	.68	.45	20.28	250	227
PEACHES FRDH		.059	100	44	.01	.02	.5	.01	3		.42	13.56	58	15
PEANUT BUT	1710		1710	33	.87	.04	4.7	.08	27		1.40	8.79	258	43
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
CANDY AVER					.01	.06	.1	.01	1		.43	28.30	167	37
COCOA BEV PD	2920		2920	48	1.31	.11	.2	1.13	5	.30	.30	29.69	192	43
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
TABASCO SCE							.0					.10	1	5
SUM	4630	2.007	7980	165	3.22	.98	18.7	1.84	122	1.09	3.92	171.93	1327	460

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MENU 4	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
HAM OMELET	127.86	22.59	13.00	3.21	44	362	2.28	936	332	26	1.99	1.70	338
POT AU GRAT	111.59	3.69	7.65	2.03	96	373	.37	587	272	14	1.13	.00	10
CHEESE SPR	18.17	5.68	15.77	1.72	158	235	.20	441	26	10	.65		39
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
OATML CK BAR	3.02	5.86	11.15	.63	14	84	.95	172	79	26	.29	.50	19
COCOA BEV PD	1.10	2.80	6.95	1.99	67	196	.81	211	487	34	.43		
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	263.19	47.81	64.18	11.57	688	1372	5.70	2550	1421	130	4.97	2.20	406

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
HAM OMELET	500		500		.24	.39	3.4	.19	51	.51	1.02	3.44	221	170
POT AU GRAT	430	.051	520	1	.04	.11	1.0	.06	10		.85	16.80	151	142
CHEESE SPR	2910		2910	27	.88	.07	.0	1.38	4		.21	1.19	169	43
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
OATML CK BAR	150	.006	160		.06	.05	.6	.02	15		1.95	29.33	241	50
COCOA BEV PD	2920		2920	48	1.31	.11	.2	1.13	5	.30	.30	29.69	192	43
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	6910	.058	7010	116	3.51	1.32	8.8	3.16	84	.92	5.24	151.66	1375	538

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MENU 5	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
SPAG/MT SCE	171.37	23.45	7.19	4.29	77	211	3.70	1095	635	48	2.81	2.27	27
CHEESE SPR	18.17	5.68	15.77	1.72	158	235	.20	441	26	10	.65		39
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
MAPLE NUT CK	13.90	6.97	22.40	1.18	56	128	1.67	325	125	30	.61	.90	32
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
TABASCO SCE	4.80	.10	.00					2	0	0			
SUM	209.68	43.39	55.02	9.18	600	696	6.66	2067	1012	108	4.55	3.17	98

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
SPAG/MT SCE		.578	960	2	.14	.27	5.2	.27	41	.68	2.49	20.50	241	227
CHEESE SPR	2910		2910	27	.88	.07	.0	1.38	4		.21	1.19	169	43
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
MAPLE NUT CK					.17	.19	1.6	.03	16		2.79	45.55	412	90
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
TABASCO SCE							.0					.10	1	5
SUM	2910	.578	3870	69	2.17	1.10	10.5	2.06	61	.79	6.41	138.55	1223	456

RECORD UTRITIVE VALUES MRE VIII

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MENU 6	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHIC ALAKING	171.52	30.03	14.41	3.27	34	229	1.84	965	415	34	1.82	2.27	84
STRAWBER SW	.13	.70	.16	.37	17	20	.51	5	131	11	.01		
PEANUT BUT	.55	12.61	19.19	1.38	18	147	.71	218	289	70	.48		
CRACKERS UST	.95	4.43	5.58	1.29	261	52	72	184	72	12	.44		
COCOA BEV PD	1.10	2.80	6.95	1.99	67	196	.81	211	487	34	.43		
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	174.76	53.34	50.37	9.00	445	715	4.97	1603	1548	170	3.21	2.27	84

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHIC ALAKING		.227	380		.05	.27	7.7	.16	32	.45	.68	7.76	281	227
STRAWBER SW		.007	10	14	.01	.01	.3	.02	7		.25	13.63	59	15
PEANUT BUT	1710		1710	33	.87	.04	4.7	.08	27		1.40	8.79	258	43
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
COCOA BEV PD	2920		2920	48	1.31	.11	.2	1.13	5	.30	.30	29.69	192	43
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	4630	.234	5020	135	3.21	1.01	16.5	1.77	71	.86	3.55	131.09	1191	419

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MENU 7	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
BEEF STEW	169.05	30.51	10.08	3.90	34	207	3.54	1044	599	43	2.41		116
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
PEANUT BUT	.55	12.61	19.19	1.38	18	147	.71	218	289	70	.48		
CHERRY NTCK	17.86	6.62	16.96	1.09	51	104	1.57	304	105	26	.52	.90	23
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
TABASCO SCE	4.80	.10	.00					2	0	0			
SUM	193.71	57.03	55.90	8.37	413	579	6.92	1773	1219	160	3.89	.90	138

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
BEEF STEW		1.267	2110	5	.05	.25	3.4	.27	34	1.59	1.82	13.46	267	227
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
PEANUT BUT	1710		1710	33	.87	.04	4.7	.08	27		1.40	8.79	258	43
CHERRY NTCK					.13	.14	1.2	.02	13		2.61	47.46	369	90
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
TABASCO SCE							.0					.10	1	5
SUM	1710	1.267	3820	78	2.03	1.01	12.9	.75	74	1.70	6.74	141.02	1295	456

RECORD (JTRITIVE VALUES MRE VIII

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MENU 8	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
HAM SLICES	84.07	26.22	5.32	4.21	7	359	1.46	1364	407	27	2.92	2.38	81
POT AU GRAT	111.59	3.69	7.65	2.03	96	373	.37	587	272	14	1.13	.00	10
JELLY	9.70	.26	.05	.05	2	3	.11	13	11	2	.01		
CRACKERS UST	.95	4.43	5.68	1.29	261	52	.72	184	72	12	.44		
BROWN CHCV	3.12	3.97	16.29	.54	34	72	1.44	78	121	30	.16	.50	16
COCOA BEV PD	1.10	2.80	6.95	1.99	67	196	.81	211	487	34	.43		
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	211.02	44.13	45.92	10.82	515	1125	5.29	2457	1524	128	5.13	2.88	107

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
HAM SLICES					.29	.26	5.1	.21	5	.36	71	.00	153	119
POT AU GRAT	430	.051	520	1	.04	.11	1.0	.06	10		85	16.80	151	142
JELLY		.004	10	1	.00	.00	.0	.00				18.29	75	28
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
BROWN CHCV	450		450	1	.40	.09	.4	.27	6		1.55	26.08	267	50
COCOA BEV PD	2920		2920	48	1.31	.11	.2	1.13	5	.30	.30	29.69	192	43
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	7800	.055	3900	91	3.02	1.15	10.4	2.06	25	.76	4.33	162.07	1238	473

RECORD OF NUTRITIVE VALUES MRE VIII

03/16/89

MENU 9	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
MEATBLS/RICE	146.81	32.64	15.45	5.40	48	293	4.79	1399	776	52	3.20	6.80	54
FRUIT MX DEH	.42	.49	.13	.23	9	12	.27	6	104	7	.01	.15	
PEANUT BUT	.55	12.61	19.19	1.38	18	147	.71	218	289	70	.48		
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
COOKIES CHCV	.74	3.03	12.17	.53	29	70	.99	94	90	22	.17	.43	11
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	149.96	55.96	56.60	9.54	413	644	7.86	1922	1484	172	4.35	7.38	66

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
MEATBLS/RICE					.07	.27	7.3	.25	32	.91	5.44	28.51	376	227
FRUIT MX DEH		.023	40	77	.01	.02	.3	.01	6		.15	13.73	58	15
PEANUT BUT	1710		1710	33	.87	.04	4.7	.08	27		1.40	8.79	258	43
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
COOKIES CHCV	490		490	2	.45	.08	.3	.27	7		.89	26.06	226	43
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	2200	.023	2240	152	2.38	.98	16.2	.99	72	1.02	8.80	146.30	1318	418

RECORD JTRITIVE VALUES MRE VIII 03/16/89

MENU 10	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
TUNA/NOODLES	172.10	26.04	8.89	2.02	29	229	2.00	603	220	39	1.36	.00	41
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
CHEESE SPR	18.17	5.68	15.77	1.72	158	235	.20	441	26	10	.65		39
CH NUT CAKE	14.79	12.57	21.79	1.17	51	130	1.98	290	152	37	.52	.90	31
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	206.50	51.48	56.11	6.90	548	716	5.27	1538	624	106	3.01	.90	111

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
TUNA/NOODLES	600		600		.18	.14	6.8	.23	34	.45	2.04	17.76	255	227
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
CHEESE SPR	2910		2910	27	.88	.07	.0	1.38	4		.21	1.19	169	43
CH NUT CAKE					.14	.14	1.4	.02	17		2.79	39.68	405	90
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	3510	.000	3510	67	2.19	.92	11.9	2.01	55	.56	5.96	129.84	1230	451

RECORD OF NUTRITIVE VALUES MRE VIII

03/16/89

MENU 11	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHIX/RICE	165.18	30.62	10.95	2.95	16	293	2.43	1039	458	36	2.22	2.27	79
PEACHES FRDH	.36	.70	.07	.30	3	13	.31	9	113	5	.01	.00	
CRACKERS UST	.95	4.43	5.58	1.29	261	52	.72	184	72	12	.44		
CHEESE SPR	18.17	5.68	15.77	1.72	158	235	.20	441	26	10	.65		39
COOKIES CHCV	.74	3.03	12.17	.53	29	70	.99	94	90	22	.17	.43	11
CANDY AVER	.77	2.65	4.79	.49	44	41	.44	74	67	11	.16	.16	
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	186.66	49.87	53.42	7.98	559	774	5.46	1861	980	106	3.69	2.85	130

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHIX/RICE					.14	.20	12.7	.39	100	.23	.68	17.10	289	227
PEACHES FRDH		.059	100	44	.01	.02	.5	.01	3		.42	13.56	58	15
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
CHEESE SPR	2910		2910	27	.88	.07	.0	1.38	4		.21	1.19	169	43
COOKIES CHCV	490		490	2	.45	.08	.3	.27	7		.89	26.06	226	43
CANDY AVER					.01	.06	.1	.01	1		.43	28.30	187	37
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	3400	.059	3500	113	2.47	1.00	17.3	2.44	115	.33	3.55	157.42	1310	455

MENU 12	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
HAM/POTATOES	174.82	23.63	8.46	3.97	18	356	1.61	1204	576	36	2.54	2.27	50
APPLESAUCE	100.27	.23	.23	.18	5	9	.44	4	77	4		.05	
CRACKERS UST	.95	4.40	5.58	1.29	261	52	.72	184	72	12	.44		
JELLY	9.70	.26	.05	.05	2	3	.11	13	11	2	.01		
BROWN CHCV	3.12	3.97	16.29	.54	34	72	1.44	78	121	30	.16	.50	16
COCOA BEV PD	1.10	2.80	6.95	1.99	67	196	.81	211	487	34	.43		
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	290.45	38.09	41.63	8.72	435	757	5.51	1714	1498	127	3.62	2.82	66

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
HAM/POTATOES	280		280		.36	.25	7.0	.36	50	.23	.68	15.92	234	227
APPLESAUCE	10		10	3	.01	.04	.2	.04	1			25.10	103	126
CRACKERS UST	0	.000	0	0	.98	.53	2.8	.38	0	.11	.91	32.75	199	45
JELLY		.004	10	1	.00	.00	.0	.00				18.29	75	28
BROWN CHCV	450		450	1	.40	.09	.4	.27	6		1.55	26.08	267	50
COCOA BEV PD	2920		2920	48	1.31	.11	.2	1.13	5	.30	.30	29.69	192	43
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	3660	.004	3670	92	3.07	1.06	11.5	2.19	61	.63	3.44	186.29	1272	565

APPENDIX M

Nutrient Composition of LLRP

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

11/21/90

TOTALS	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
1	10.67	35.62	44.35	9.93	299	542	4.80	2643	1216	119	5.83	2.13	19
2	6.25	40.01	50.83	10.18	209	719	6.99	2166	1566	159	4.60	7.46	11
3	13.97	37.42	48.24	10.63	404	601	5.72	2879	1198	124	6.39	3.05	0
4	11.52	46.45	41.54	10.50	604	850	5.27	2348	1203	126	4.09	3.53	11
5	10.80	22.13	49.53	8.31	99	425	3.14	2471	583	128	5.42	3.26	16
6	10.94	38.74	43.13	9.11	168	477	8.03	2224	1327	135	5.16	3.48	19
7	7.96	44.02	55.72	12.74	553	946	8.39	2075	2190	210	4.67	6.30	16
8	13.44	41.99	46.58	9.41	436	586	7.20	1754	1812	162	4.30	5.24	0
MEAN	10.70	38.30	47.49	10.10	346	643	6.19	2320	1387	145	5.06	4.31	15
MEAL REQUIREMENTS 1/3 AR 40-25		33.33	53.3		267	267	6.0	1667-2334	625-1825	133		5.0	

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	400	1.063	2170	30	.40	.54	15.4	.40	31	.02	5.04	213.93	1397	315
2	3540	2.400	7540	73	2.15	.58	13.1	1.83	26	.30	1.89	163.29	1271	271
3	3070	.034	3130	76	1.45	1.36	13.2	.78	78	.02	3.49	204.25	1401	315
4	740	.027	780	105	1.21	1.11	30.7	.91	49	.56	7.28	229.71	1479	340
5	580	.006	590	16	.81	.56	20.0	.78	19		2.11	235.44	1476	326
6	660	.030	710	61	.75	1.02	12.7	.26	64	.02	6.07	190.57	1305	293
7	580	.006	590	105	1.26	1.10	8.7	.66	20		4.21	193.40	1451	314
8	250	.037	310	24	.48	.97	8.9	.06	18	.02	3.16	180.07	1307	292
MEAN	1228	.450	1978	61	1.06	.91	15.3	.71	38	.16	4.16	201.33	1386	308
MEAL REQUIREMENTS 1/3 AR 40-25			1670	20	0.60	0.73	8.0(N.E.)	0.73	133	1.0	3.3	146.7	1200	

PERCENT OF CALORIES FROM: PROTEIN - 11 PERCENT
FAT - 31 PERCENT
CHO - 58 PERCENT

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

11/21/90

MENU 1	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHICK STEW	1.45	20.63	18.55	7.77	153	330	1.53	2207	859	65	5.08	1.63	
CORNFLAKE BR	2.18	3.58	7.95	.48	3	13	.31	176	66	5	.34		
OATML COOKIE	3.02	5.86	11.15	.63	14	84	.95	172	79	26	.29	.50	19
TOOTSIE ROLL	3.56	5.17	5.04	.36	25	38	1.58	67	59	13	.09		
CIDER MIX	.08	.09	.56	.21	93	39	.17	2	1	2	.01	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	10.67	35.62	44.35	9.93	299	542	4.80	2643	1216	119	5.83	2.13	19

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHICK STEW		1.030	1720	9	.31	.25	13.4	.35				53.59	464	102
CORNFLAKE BR	250	.027	290		.02	.13	.6	.03	12	.02	1.72	28.81	201	43
OATML COOKIE	150	.006	160		.06	.05	.6	.02	15		1.95	29.33	241	50
TOOTSIE ROLL					.02	.06	.1	.01	4		1.37	42.86	237	57
CIDER MIX				6								49.06	202	50
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	400	1.063	2170	30	.40	.54	15.4	.40	31	.02	5.04	213.93	1397	315

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

11/21/90

MENU 2	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
BEEF STEW FD	1.11	28.66	18.10	6.07	42	272	3.70	1689	623	50	3.58	6.17	
GRANOLA BAR	1.62	3.95	9.16	.58	20	111	.96	12	147	38	.06	.86	
COOKIES CHCV	.74	3.03	12.17	.53	29	70	.99	94	90	22	.17	.43	11
CARAMELS	1.31	1.29	3.36	.53	39	32	.27	141	67	5	.33	.00	
COCOA BEV PD	1.10	2.80	6.95	1.99	67	196	.81	211	487	34	.43		
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	6.25	40.01	50.83	10.18	209	719	6.99	2166	1566	159	4.60	7.46	11

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
BEEF STEW FD		2.394	3990	9	.25	.24	11.0	.38				41.06	442	95
GRANOLA BAR	130	.006	140		.13	.05	.7	.03	13		.56	27.69	209	43
COOKIES CHCV	490		490	2	.45	.08	.3	.27	7		.89	26.06	226	43
CARAMELS					.01	.05	.1	.01	0		.14	28.51	149	35
COCOA BEV PD	2920		2920	48	1.31	.11	.2	1.13	5	.30	.30	29.69	192	43
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	3540	2.400	7540	73	2.15	.58	13.1	1.83	26	.30	1.89	163.29	1271	271

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

11/21/90

MENU 3	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
TURKEY TETRA	1.70	25.70	16.54	7.46	171	353	1.99	2349	597	55	5.21	2.47	
RICE/CORN BR	2.19	4.24	7.91	.49	4	18	.99	155	68	6	.31		
FIG BAR	8.35	2.41	5.78	.88	40	36	1.15	251	164	14	.53	.58	
CHOC W/TOFFE	1.27	4.70	16.35	1.11	85	116	1.15	103	217	39	.31		
CIDER MIX	.08	.09	.56	.21	93	39	.17	2	1	2	.01	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	13.97	37.42	48.24	10.63	404	601	5.72	2879	1198	124	6.39	3.05	

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
TURKEY TETRA	100		100	9	.31	.67	7.1					43.61	426	95
RICE/CORN BR	510	.024	550	1	.20	.34	3.8	.23	46	.02	2.75	28.16	201	43
FIG BAR		.010	20		.03	.15	1.3	.02	2		.29	40.58	224	58
CHOC W/TOFFE	2460		2460	45	.90	.16	.2	.52	30		.45	32.56	296	56
CIDER MIX				6								49.06	202	50
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	3070	.034	3130	76	1.45	1.36	13.2	.78	78	.02	3.49	204.25	1401	315

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

11/21/90

MENU 4	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHIX ALAKING	4.35	39.46	19.33	7.64	194	572	3.17	2029	756	86	3.52	3.10	
CORNFLAKE BR	2.18	3.58	7.95	.48	3	13	.31	176	66	5	.34		
COOKIES CHCV	.74	3.03	12.17	.53	29	70	.99	94	90	22	.17	.43	11
STARCH JELLY	3.31	.03	.06	.13	1	0	.02	12	0	0	.01		
ORANGE BEV	.58	.07	.93	1.23	365	157	.52	18	139	4	.01	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	11.52	46.45	41.54	10.50	604	850	5.27	2348	1203	126	4.09	3.53	11

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHIX ALAKING					.36	.43	28.3	.26	28	.54	2.56	64.22	589	135
CORNFLAKE BR	250	.027	290		.02	.13	.6	.03	12	.02	1.72	28.81	201	43
COOKIES CHCV	490		490	2	.45	.08	.3	.27	7		.89	26.06	226	43
STARCH JELLY	0	.000	0	0	.00	.00	.0					53.18	213	57
ORANGE BEV				88	.37	.43	.7	.35	2		2.10	47.17	197	50
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	740	.027	780	105	1.21	1.11	30.7	.91	49	.56	7.28	229.71	1479	340

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

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MENU 5	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHICK W/RICE	2.33	13.75	22.07	6.46	31	201	.41	2342	125	34	5.15	1.90	
GRANOLA BAR	1.62	3.95	9.16	.58	20	111	.96	12	147	38	.06	.86	
BROWN CHCV	3.12	3.97	16.29	.54	34	72	1.44	78	121	30	.16	.50	16
STARCH JELLY	[illegible]	.03	.06	.13	1	0	.02	12	0	0	.01		
LEMON TEA	.06	.15	.86	.11	1	3	.07	8	38	18	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	10.80	22.13	49.53	8.31	99	425	3.14	2471	583	128	5.42	3.26	16

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHICK W/RICE					.28	.39	18.1	.48				91.39	619	136
GRANOLA BAR	130	.006	140		.13	.05	.7	.03	13		.56	27.69	209	43
BROWN CHCV	450		450	1	.40	.09	.4	.27	6		1.55	26.08	267	50
STARCH JELLY	0	.000	0	0	.00	.00	.0					53.18	213	57
LEMON TEA				0								26.82	116	28
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	580	.006	590	16	.81	.56	20.0	.78	19		2.11	235.44	1476	326

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

11/21/90

MENU 6	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
SPAG/MEAT SC	1.67	20.71	14.95	6.92	78	267	4.13	1810	967	82	4.44	2.98	
RICE/CORN BR	2.19	4.24	7.91	.49	4	18	.99	155	68	6	.31		
OATML COOKIE	3.02	5.86	11.15	.63	14	84	.95	172	79	26	.29	.50	19
TOOTSIE ROLL	3.56	5.17	5.04	.36	25	38	1.58	67	59	13	.09		
BEVERAGE BSE	.12	2.48	2.99	.22	36	33	.12	2	2	0	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	10.94	38.74	43.13	9.11	168	477	8.03	2224	1327	135	5.16	3.48	19

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
SPAG/MEAT SC				20	.48	.53	7.4					51.75	424	96
RICE/CORN BR	510	.024	550	1	.20	.34	3.8	.23	46	.02	2.75	28.16	201	43
OATML COOKIE	150	.006	160		.06	.05	.6	.02	15		1.95	29.33	241	50
TOOTSIE ROLL					.02	.06	.1	.01	4		1.37	42.86	237	57
BEVERAGE BSE				25								28.19	150	34
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	660	.030	710	61	.75	1.02	12.7	.26	64	.02	6.07	190.57	1305	293

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

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MENU 7	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
CHILI C/CARN	1.87	35.75	27.94	9.81	117	567	4.68	1940	1630	130	4.42	4.94	
GRANOLA BAR	1.62	3.95	9.16	.58	20	111	.96	12	147	38	.06	.86	
BROWN CHCV	3.12	3.97	16.29	.54	34	72	1.44	78	121	30	.16	.50	16
CHARMS	.40	.00	.31	.09	6	2	.54	9	1				
ORANGE BEV	.58	.07	.93	1.23	365	157	.52	18	139	4	.01	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	16	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	7.96	44.02	55.72	12.74	553	946	8.39	2075	2190	210	4.67	6.30	16

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
CHILI C/CARN				1	.36	.49	6.1					54.63	613	130
GRANOLA BAR	130	.006	140		.13	.05	.7	.03	13		.56	27.69	209	43
BROWN CHCV	450		450	1	.40	.09	.4	.27	6		1.55	26.08	267	50
CHARMS				0	.00	.00	.0	.00				27.56	113	28
ORANGE BEV				88	.37	.43	.7	.35	2		2.10	47.17	197	50
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	580	.006	590	105	1.26	1.10	8.7	.66	20		4.21	193.40	1451	314

RECORD OF NUTRITIVE VALUES LONG LIFE RATION PACKET PROPOSED

11/21/90

MENU 8	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOS (MG)	IRON (MG)	SODIUM (MG)	POTASS (MG)	MAGNESIUM (MG)	NACL (G)	ZINC (MG)	CHOLESTROL (MG)
LASAGNA	1.88	28.91	20.19	6.62	293	408	4.90	1227	1261	88	3.24	4.18	
CORNFLAKE BR	2.18	3.58	7.95	.48	3	13	.31	176	66	5	.34		
FIG BAR	8.35	2.41	5.78	.88	40	36	1.15	251	164	14	.53	.58	
M&MS	.60	6.67	10.70	.84	87	88	.52	73	132	28	.15	.48	
LEMON TEA	.06	.15	.86	.11	1	3	.07	8	38	18	.00	.00	
COFFEE INSTA	.06	.00	.00	.24	4	10	.14	2	81	8	.00		
CREAM SUB ND	.30	.28	1.09	.22	7	28	.11	18	71	1	.03		
SUGAR	.00	.00	.00	.03	0	0	.01	0	0	0	.00		
SUM	13.44	41.99	46.58	9.41	436	586	7.20	1754	1812	162	4.30	5.24	

	A (IU)	CAROTENE (MG)	TOTAL A (IU)	C (MG)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	FOLACIN (MCG)	B12 (MCG)	E (MG)	CHO (G)	CALORIES	WEIGHT (G)
LASAGNA				9	.40	.53	6.0					44.41	475	102
CORNFLAKE BR	250	.027	290		.02	.13	.6	.03	12	.02	1.72	28.81	201	43
FIG BAR		.010	20		.03	.15	1.3	.02	2		.29	40.56	224	58
M&MS					.02	.12	.3	.01	4		1.15	29.17	240	48
LEMON TEA				0								26.82	116	28
COFFEE INSTA				15		.01	.8	.00				2.19	9	3
CREAM SUB ND						.03		.00				2.11	19	4
SUGAR	0	.000	0	0	.00	.00	.0	.00				5.97	24	6
SUM	250	.037	310	24	.48	.97	8.9	.06	18	.02	3.16	180.07	1307	292

APPENDIX N

Nutrients with Incomplete Data Base

Percent of Data Missing on Nutrient Composition Data Base

	Arctic T	MRE	LLRP
Vitamin A	45	44	53
Vitamin E	55	50	62
Ascorbic Acid	44	28	38
Folacin	30	48	62
Vitamin B_{12}	68	74	89
Zinc	36	63	57
Cholesterol	67	76	93

APPENDIX O

Nutritional Intake with Missing Data

Mean[1] Daily Nutritional Intake (Includes Missing Data)

Nutrient[2]	Unit	MRDA[3]	T/MRE/T (n=51)	%MRDA	T/LLRP/T (n=45)	%MRDA
*Energy	kcal	**4500**	3213 ± 112	71	2911 ± 106	65
*Protein	g	**100**	131.2 ± 3.9	131	104.3 ± 3.4	104
Carbohydrate	g	**619**[4]	369 ± 15	60	367 ± 16	59
*Fat	g	**175**[5]	136 ± 5	78	116 ± 4	66
*Thiamin	mg	**1.6**	3.83 ± 0.29	239	1.93 ± 0.15	121
*Riboflavin	mg	**1.9**	3.02 ± 0.08	159	2.39 ± 0.10	126
Niacin	mg NE	**21**	26.57 ± 0.69	127	26.33 ± 0.90	125
*Vitamin B_6	mg	**2.2**	2.23 ± 0.13	101	1.24 ± 0.08	56
*Calcium	mg	**800-1200**	1406 ± 46	141	1077 ± 53	108
*Phosphorus	mg	**800-1200**	2084 ± 62	208	1712 ± 60	171
Magnesium	mg	**350-400**	368 ± 12	98	348 ± 12	93
*Iron	mg	**10-18**	18.62 ± 0.52	133	16.21 ± 0.52	116
Sodium	mg	**5500**[6]	5724 ± 222	104	5317 ± 234	97

[1]Mean ± SEM.
[2]Values with an asterisk (*) indicate statistically significant difference ($p \leq 0.05$) between groups.
[3]MRDA for males ≥ 17 years old, for a cold environment (< 57.2°F).
[4]Although there is no MRDA for carbohydrate, military feeding guidelines suggest 50 to 55 percent of energy intake to be from carbohydrate.
[5]Although there is no MRDA for fat, military feeding guidelines suggest 35 to 40 percent of energy intake to be from fat in a cold environment.
[6]Maximum amount allowed.

Mean[1] Daily Nutritional Intake for the T/MRE/T Group (With Missing Data)

Nutrient	Unit	Total	Breakfast	Lunch	Dinner
Energy	kcal	**3213 ± 112**	1118 ± 46	1072 ± 79	1069 ± 32
Protein	g	**131.2 ± 3.9**	46.4 ± 1.7	39.3 ± 2.6	47.3 ± 1.2
Carbohydrate	g	**369 ± 15**	115 ± 6	130 ± 10	130 ± 4
Fat	g	**136 ± 5**	54 ± 2	44 ± 3	40 ± 1
Thiamin	mg	**3.83 ± 0.29**	0.98 ± 0.07	2.15 ± 0.24	0.79 ± 0.04
Riboflavin	mg	**3.02 ± 0.08**	1.35 ± 0.04	0.79 ± 0.05	0.90 ± 0.03
Niacin	mg NE	**26.57 ± 0.69**	9.10 ± 0.30	8.33 ± 0.50	9.53 ± 0.24
Vitamin B_6	mg	**2.23 ± 0.13**	0.68 ± 0.03	1.21 ± 0.12	0.39 ± 0.01
Calcium	mg	**1406 ± 46**	511 ± 19	404 ± 31	507 ± 17
Phosphorus	mg	**2084 ± 62**	781 ± 29	584 ± 41	746 ± 21
Magnesium	mg	**368 ± 12**	120 ± 5	114 ± 8	139 ± 4
Iron	mg	**18.62 ± 0.52**	7.23 ± 0.26	4.59 ± 0.30	7.01 ± 0.20
Sodium	mg	**5724 ± 222**	2059 ± 94	1539 ± 111	2195 ± 92

[1]Mean ± SEM; n=51; Totals do not add up due to rounding.

Mean[1] Daily Nutritional Intake for the T/LLRP/T Group (With Missing Data)

Nutrient	Unit	Total	Breakfast	Lunch	Dinner
Energy	kcal	**2911 ± 106**	838 ± 42	1184 ± 74	933 ± 35
Protein	g	**104.3 ± 3.4**	32.9 ± 1.7	33.3 ± 1.9	39.4
Carbohydrate	g	**367 ± 16**	86 ± 6	171 ± 12	116 ± 5
Fat	g	**116 ± 4**	41 ± 2	41 ± 3	35 ± 1
Thiamin	mg	**1.93 ± 0.15**	0.60 ± 0.05	0.81 ± 0.12	0.55 ± 0.03
Riboflavin	mg	**2.39 ± 0.10**	0.95 ± 0.05	0.72 ± 0.05	0.75 ± 0.03
Niacin	mg NE	**26.33 ± 0.90**	6.79 ± 0.31	11.65 ± 0.83	8.30 ± 0.25
Vitamin B_6	mg	**1.24 ± 0.08**	0.47 ± 0.03	0.43 ± 0.03	0.35 ± 0.02
Calcium	mg	**1077 ± 53**	362 ± 23	312 ± 26	417 ± 23
Phosphorus	mg	**1712 ± 60**	565 ± 32	553 ± 32	616 ± 24
Magnesium	mg	**348 ± 12**	98 ± 5	135 ± 8	120 ± 5
Iron	mg	**16.21 ± 0.52**	5.18 ± 0.22	4.95 ± 0.31	6.28 ± 0.22
Sodium	mg	**5317 ± 234**	1421 ± 81	2115 ± 168	1851 ± 96

[1]Mean ± SEM; n=45; Totals do not add up due to rounding.

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